NOISE ASSESSMENT

MILK PROCESSING FACILITY

ERSKINE PARK

Murray Goulburn Cooperative Limited

29 August 2013

Job Number 13060194

Prepared by

Todoroski Air Sciences Pty Ltd
Suite 2B, 14 Glen Street
Eastwood, NSW 2122
Phone: (02) 9874 2123
Fax: (02) 9874 2125
Email: info@airsciences.com.au

Noise Assessment
Milk Processing Facility
Erskine Park

Author(s):	George Jenner	A Todoroski
Position:	Associate	Director
Date:	13/8/2013	27/08/2013

DOCUMENT CONTROL

Report Version	Date	Prepared by	Reviewed by
WORKING DRAFT	8/7/13	George Jenner (WM)	A. Todoroski
DRAFT - 001	13/8/13	George Jenner (WM)	A Todoroski
Draft - 002	27/8/2013	A Todoroski	S Korch
FINAL - 001	29/08/2013	P Henschke	A Todoroski

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GLOSSARY OF ACOUSTIC TERMS

Most environments are affected by environmental noise which continuously varies, largely as a result of road traffic. To describe the overall noise environment, a number of noise descriptors have been developed and these involve statistical and other analysis of the varying noise over sampling periods, typically taken as 15 minutes. These descriptors, which are demonstrated in the graph below, are here defined.

Maximum Noise Level (L_{Amax}) – The maximum noise level over a sample period is the maximum level, measured on fast response, during the sample period.

L_{A1} – The L_{A1} level is the noise level which is exceeded for 1% of the sample period. During the sample period, the noise level is below the L_{A1} level for 99% of the time.

L_{A10} – The L_{A10} level is the noise level which is exceeded for 10% of the sample period. During the sample period, the noise level is below the L_{A10} level for 90% of the time. The L_{A10} is a common noise descriptor for environmental noise and road traffic noise.

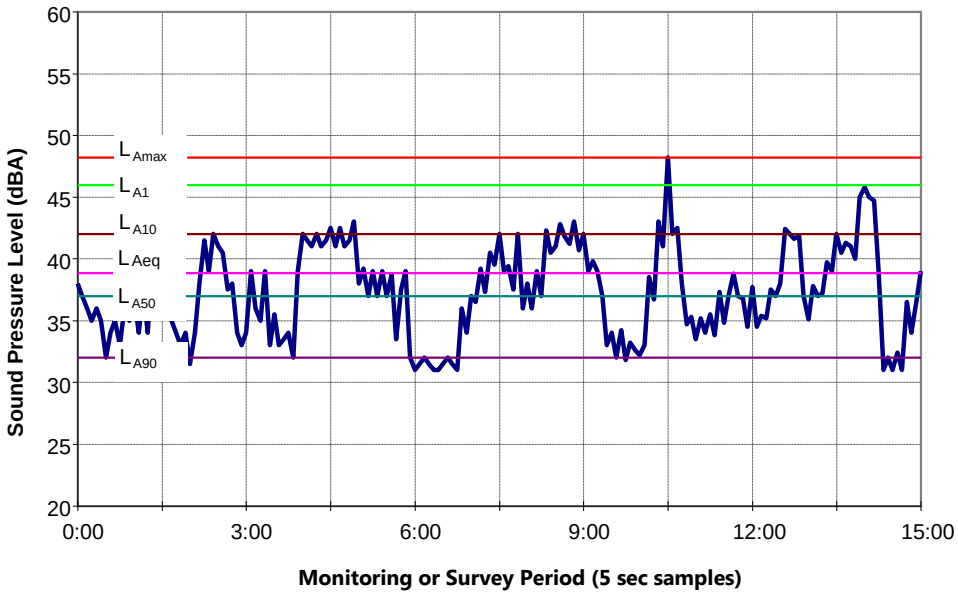
L_{A90} – The L_{A90} level is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the L_{A90} level for 10% of the time. This measure is commonly referred to as the background noise level.

L_{Aeq} – The equivalent continuous sound level (L_{Aeq}) is the energy average of the varying noise over the sample period and is equivalent to the level of a constant noise which contains the same energy as the varying noise environment. This measure is also a common measure of environmental noise and road traffic noise.

ABL – The Assessment Background Level is the single figure background level representing each assessment period (daytime, evening and night time) for each day. It is determined by calculating the 10th percentile (lowest 10th percent) background level (L_{A90}) for each period.

RBL – The Rating Background Level for each period is the median value of the ABL values for the period over all of the days measured. There is therefore an RBL value for each period – daytime, evening and night time. An example of a typical graph showing Sound Pressure Level versus Time is shown below.

Typical Graph of Sound Pressure Level vs. Time



1 INTRODUCTION

Todoroski Air Sciences has been engaged by KMH Environmental on behalf of Murray Goulburn Cooperative Limited (hereafter referred to as the Proponent) to provide a Noise Impact Assessment for a proposed milk processing facility (the Project) at Erskine Park, NSW. The proposed facility will process approximately 150 million litres of milk per year, sourced from locally based dairy farms (under normal seasonal conditions). Milk will be processed into 1, 2 and 3 litre plastic containers for distribution throughout NSW, through the Coles Myer distribution chain.

This report assesses potential noise that may arise due to the operation and construction of the facility. The report covers:

- Noise from the processing plant;
- Noise from external equipment;
- Noise from vehicles on site; and
- Noise from extra traffic generated by the development.

The noise assessment was prepared following the guidelines of the NSW Environment Protection Authority (EPA) contained within the NSW Industrial Noise Policy (INP), the Interim Construction Noise Guideline (ICNG) and the Road Noise Policy (RNP).

2 PROJECT DESCRIPTION

2.1 Site location

The Project site is located wholly within the Erskine Park Business Area, at 111-113 Quarry Road, Erskine Park NSW 2759, as shown in **Figure 2-1**. The total area of the site is 5.07 hectares.

There is a 6m fall across the site with the low point in the south east corner. A 4-6m high retaining wall on the northern boundary will provide acoustic shielding to the north.

Access to the site is via Quarry Road and James Erskine Drive which joins Mamre Road at the western extent of the Erskine Park Business Area.

Figure 2-1: Site Location

2.2 Description of the building and site

Figure 2-2 shows the site layout. For noise assessment the following should be noted:

- The path of all heavy vehicles follows the boundary of the site in a clockwise direction;
- Most processing is fully contained within the building, shown in yellow;
- There will be some external pumps and compressors; and
- Ventilation will be assisted by four roof-mounted exhaust fans.

Figure 2-2: Site layout

Figure 2-3 shows an architectural view from the Quarry Road entrance to the site. **Figure 2-4** shows the anticipated view from the retaining wall on the northern boundary of the site.

Source: MGC 2013

Figure 2-3: View from Quarry Road entrance

Source: MGC 2013

Figure 2-4: View from retaining wall - North East of site

2.3 Sensitive Receivers

The nearest sensitive receivers to the site are shown in **Figure 2-5**. The locations are described in **Table 2-1**.

The EPA guidelines consider various land uses to be sensitive to noise, such as residential land, churches, schools, hospitals and recreation areas.

Figure 2-5: Sensitive receivers

Table 2-1: Location of sensitive receivers

Location Number	Address	Description
1	Catholic Health Care Services	Hospital
2	Emmaus Catholic College, Trinity Catholic Primary School	School (non-boarding)
3	Mamre Anglican School	School (non-boarding)
4	654-674 Mamre Road, Kemps Creek	Isolated Residential
5	Mamre Road, Kemps Creek (Lot 34, DP1118173)	Isolated Residential
6	573-577 Mamre Road, Orchard Hills	Isolated Residential
7	539-571 Mamre Road, Orchard Hills	Isolated Residential
8	1-19 Mandalong Close, Orchard Hills	Isolated Residential
9	Verdi Glen, St Clare	Suburban Residential
10	2 Carcoar Close, Erskine Park	Suburban Residential
11	6 Ridgeview Crescent, Erskine Park	Suburban Residential

3 NOISE CRITERIA

3.1 Industrial Noise Policy

Noise emission from the site is assessed against the guidelines of the *NSW Industrial Noise Policy (*INP*)*.

For residences the INP has criteria to assess *intrusiveness* and *amenity*.

In general, the intrusiveness criterion requires that the L_{Aeq} noise level from the project should not exceed the Rating Background Level (RBL) by more than 5dBA.

The amenity criterion sets an upper limit to control the total L_{Aeq} noise level from all industrial sources. In this case, the potentially affected residences are in an area which would be classified as "Suburban" and the relevant recommended "acceptable" amenity criteria for $L_{Aeq,period}$ are 55, 45 and 40dBA for daytime, evening and night time periods respectively. "Maximum" recommended levels are all 5dBA higher. Residences on Mamre Road would currently experience high levels of traffic noise. In such cases, the amenity criteria may be set at 10dBA below the $L_{Aeq,period}$ of traffic noise.

As the plant will operate continuously, assessment in night time hours should account for short term transient noise events, which may cause sleep disturbance.

For schools and hospitals the INP has specific criteria not related to background level.

3.2 Background Noise Levels

Noise logging has recently been carried out by Wilkinson Murray at relevant locations in Erskine Park for separate developments in the Erskine Park Business Area. These logging results are considered suitable for setting limits for the current proposal.

Long-term ambient noise levels were monitored at four locations surrounding the site, selected to cover the range of environments in the potentially affected receiver areas. The locations are shown in **Figure 3-1**. The addresses, and results are shown in **Table 3-1**.

Noise monitoring at Locations A and B was conducted between 19 and 26 July 2010, and at Location C between 4 and 15 May 2012. The noise monitoring equipment used for these measurements consisted of ARL Type EL-215 environmental noise loggers set to A-weighted, fast response, continuously monitoring over 15-minute sampling periods. This equipment is capable of remotely monitoring and storing noise level descriptors for later detailed analysis. The equipment calibration was checked before and after the survey and no significant drift was noted.

The logger determines L_{A1}, L_{A10}, L_{A90} and L_{Aeq} levels of the ambient noise. L_{A1}, L_{A10} and L_{A90} are the levels exceeded for 1%, 10% and 90% of the sample time respectively (see **Appendix A** for definitions). The L_{A1} is indicative of maximum noise levels due to individual noise events such as the occasional pass-by of a heavy vehicle. The L_{A90} level is normally taken as the background noise level during the relevant period.

Detailed results for each monitoring location are shown in graphical form in **Appendix A**. The graphs show measured values of L_{Aeq}, L_{A90}, L_{A10} and L_{A1} for each 15-minute monitoring period. Periods where measurements were invalid, for example due to rain or wind, are greyed out on the graphs. The RBLs

were determined according to the guidelines of the INP, and sufficient data was collected to yield a valid result.

Figure 3-1: Location A – Noise Monitor Locations

Table 3-1 summarises the noise results, for daytime, evening, night time periods as defined by the EPA's INP. The summary noise descriptors are:

- L_{Aeq} (period) – the equivalent continuous L_{Aeq} noise level measured over the assessment period;
- RBL – Rating Background Level is a measure of typical background noise levels which are used in determining noise criteria;
- Location A noise levels are considered suitable for assessment at residences on Mamre Road;
- Location B noise levels are considered suitable for assessment at the schools and hospital. Although it is slightly closer to Mamre Road than the sensitive receivers, the background is not expected to be significantly different; and,

- Location C noise levels are considered suitable for assessment at the residences in suburban areas north of the proposal as it is located within the nearest residential area.

Table 3-1: Summary of Measured Noise Levels

Noise Monitoring Location	Address	RBL (dBA)			$L_{Aeq,period}$ (dBA)		
		Daytime 7am-6pm	Evening 6-10pm	Night time 10pm - 7am	Daytime 7am-6pm	Evening 6-10pm	Night time 10pm - 7am
A	657 Mamre Rd	47	47	43	59	58	57
B	25 Bakers Lane	47	46	40	60	56	56
C	5 Bally Leaney Place	36	37	35	52	44	43

3.3 Residential Noise Criteria

Noise criteria derived from the noise logging results are shown in **Table 3-2**. As no significant existing industrial noise was detected at the logging locations, the amenity criteria have not been adjusted to account for pre-existing industrial noise.

In the case of location A the "high traffic noise criterion" has been applied. This is a provision in the INP that applies to areas where:

- Traffic noise is identified as the dominant noise source at the site;
- The existing traffic noise level (determined using the procedure outlined in **Section 3.2**) is 10 dB or more above the Acceptable noise level for the area; and,
- It is highly unlikely the road traffic noise levels would decrease in the future.

Table 3-2: Residential Noise Criteria

Noise Logging Site	Applies to Sensitive Receivers	Intrusiveness $L_{Aeq,15min}$ (dBA)			Amenity $L_{Aeq,period}$ (dBA)		
		Daytime 7am-6pm	Evening 6-10pm	Night time 10pm - 7am	Daytime 7am-6pm	Evening 6-10pm	Night time 10pm - 7am
A	4, 5, 6, 7, 8	52	52	48	60	50	47[1]
C	9, 10, 11	41	42	40	52	44	43

Note 1: High traffic noise criterion

3.4 Sleep Disturbance

The INP does not address sleep disturbance and guidance is derived from the EPA's Noise Guide for Local Government (*NGLG)* which notes that:

Currently, there is no definitive guideline to indicate a noise level that causes sleep disturbance and more research is needed to better define this relationship. Where likely disturbance to sleep is being assessed, a screening test can be applied that indicates the potential for this to occur.

For example, this could be where the subject noise exceeds the background noise level by more than 15 dB(A). The most appropriate descriptors for a source relating to sleep disturbance would be $L_{A1\ (1\ minute)}$ (the level exceeded for 1% of the specified time period of 1 minute) or L_{Amax} (the maximum level during the specified time period) with measurement outside the bedroom window.

Based on the above advice sleep disturbance screening criteria have been established at nearby residences for the operational period between 10 pm and 7 am, and are shown in **Table 3-3**. Although not mentioned by the INP, the hospital at Location 1 will also be assessed for sleep disturbance in case there are wards with openable windows.

Table 3-3: Residential Sleep Disturbance Criteria

Noise Logging Site	Applies to Sensitive Receivers	Night time 10pm - 7am	
		RBL (dBA)	Criteria, $L_{A1.1min}$ (dBA)
A	4, 5, 6, 7, 8	43	58
B	1	40	55
C	9, 10, 11	35	50

If an exceedance of the above "screening criterion" is indicated then further review is required.

3.5 Schools and Hospital

The INP guidelines for schools and hospitals are given in **Table 3-4**. They apply to the noisiest 1-hour period from industry that coincides with the use of the school or hospital.

Table 3-4: Criteria $L_{Aeq,1hr}$ dBA - noisiest 1-hour period when in use

Type of Receiver	Recommended L_{Aeq} (dBA)	
	Acceptable	Maximum
School classroom internal	35	40
Hospital Ward internal	35	45
Hospital Ward external	50	55
Playground	55	60

For schools the acceptable internal noise criterion is 35 dBA. For impact assessment purposes it is generally assumed noise internally will be attenuated by 10dBA by the façade (assuming open windows), giving an acceptable external criterion of 45dBA for classrooms. This will applied in the assessment as the criterion for schools in this case.

4 NOISE SOURCE LEVELS

4.1 Noise Sources

The noise emitted from the site has been estimated using typical noise levels from plant used on similar dairy projects. The noise levels used have been selected conservatively, so the actual noise level is likely to be substantially lower than that estimated.

The predominant noise source is the flow of heavy vehicles around the site. This is unaffected by choice and siting of other equipment.

4.2 Internal Noise Sources

The majority of the processing equipment will be located within the plant building. It has been assumed that the inside noise level is 95 dBA throughout the building, although this level is only likely to be reached in some specific process areas such as pasteurisation. The building will be constructed with a concrete slab floor on the ground, insulated foam panel or tilt-up concrete panel walls, an insulated foam panel ceiling and a sheet metal roof. The area of windows and doors will be small compared to

the wall and roof area and they will be kept closed. A conservative R_w (or noise reduction value) for the noise passing through the building envelope of 33 dB has been used to estimate the noise level outside the building.

4.3 External Noise Services

The following items of plant and vehicles operating externally on the site have been allowed for in the noise assessment:

Table 4-1: Source Noise Levels, L_{Aeq} dBA

Noise Source	Noise Source Sound Power Level (dBA)
Ten external pumps, including pumps for transferring milk from the tankers to the milk receiving tanks and from the receiving tanks into the factory, for supplying wash water and supplying "Clean in Place" (CIP) cleaning water/chemicals to various parts of the plant	86
Plant air compressor (housed in a standard noise attenuating enclosure)	55
Water chiller unit (housed in a standard noise attenuating enclosure)	74
Gas fired boiler air intake (equipped with noise attenuating louvers) and stack	76
Four large roof mounted exhaust fans	82
Four air conditioning compressor units for the cool stores and general air conditioning	79
One forklift truck operating outside at any given time [1]	80
One semitrailer or milk tanker driving at 10 kph on site at any given time.[1]	102.5
Main Plant Building (external noise break-out)	89

Note 1 – LAeq,15min includes reversing alarms

It is expected that up to 16 heavy vehicle trips (8 in, 8 out) including B-doubles, may occur in any hour. As an extreme worst case for modelling purposes, it was assumed that there would be 12 heavy vehicles in any 15 minute period.

5 OPERATIONAL NOISE ASSESSMENT

5.1 Meteorology

At relatively large distances from a source, the resultant noise levels at receivers can be influenced by meteorological conditions, particularly wind and temperature gradients, and can therefore vary from hour to hour and night to night. Where these factors are a feature of an area their effect on resultant noise levels is required to be taken into account.

The procedures described in the INP are directed toward finding a single set of meteorological conditions, representing generally adverse conditions for noise propagation, which should be used in noise assessment.

The default inversion parameters given in the INP were used in this assessment. For non-arid areas the default parameters are:

- 3°/100m temperature inversion strength for all receivers, plus a 2m/s source-to-receiver drainage wind speed for those receivers where applicable.

In this case receivers are level with, or elevated with respect to the site. Hence no drainage wind was included.

As the proposal operates on a 24-hour basis, the same noise sources were used for day, evening and night time analysis, and the temperature inversion effect applied to the night time noise prediction.

5.2 Modelling Procedure

Noise levels were predicted using the "Cadna A" acoustic noise prediction software using ISO 9613 noise prediction algorithm. Factors that are addressed in the noise modelling are:

- equipment sound level emissions and location;
- receiver locations;
- ground topography;
- noise attenuation due to geometric spreading;
- ground absorption; and
- atmospheric absorption.

5.3 Noise Model Scenarios

A worst case 15-minute period was considered to comprise:

- All processing plant operational; and
- 12 trucks entering and leaving the site.

Although delivery truck arrivals will be sporadic, this was considered a worst case for the hours 6.00am to 12 noon. As the hour 6.00am to 7.00am is considered part of the night time period, the worst case 15-minute emission is the same for daytime and night time. The difference in the scenarios is the application of temperature inversion conditions to the night time scenario.

5.4 Predicted Noise Levels

Predicted noise levels arising from the operation of the facility at sensitive receivers are presented in **Table 5-1**.

Table 5-1: Predicted Noise Levels (dBA) at Sensitive Receiver Locations

Receptor		Daytime/Evening			Night time		
Location	Address	Prediction	Criterion	Complies?	Prediction	Criterion	Complies?
1	Catholic Health Care Services	29	50	Yes	34	50	Yes
2	Emmaus Catholic College, Trinity Catholic Primary School	31	45	Yes	n/a	n/a	n/a
3	Mamre Anglican School	29	45	Yes	n/a	n/a	n/a
4	654-674 Mamre Road, Kemps Creek	29	52	Yes	34	48	Yes
5	Mamre Road, Kemps Creek (Lot 34, DP1118173)	26	52	Yes	31	48	Yes
6	573-577 Mamre Road, Orchard Hills	30	52	Yes	35	48	Yes
7	539-571 Mamre Road, Orchard Hills	28	52	Yes	33	48	Yes
8	1-19 Mandalong Close, Orchard Hills	26	41	Yes	31	40	Yes
9	Verdi Glen, St Clare	24	41	Yes	30	40	Yes
10	2 Carcoar Close, Erskine Park	24	41	Yes	30	40	Yes
11	6 Ridgeview Crescent, Erskine Park	23	41	Yes	29	40	Yes

n/a – not applicable as the school does not operate at night.

The predicted noise levels presented in **Table 5-1** are well below the recommended INP noise criteria. Night time noise contours are presented in **Figure 5-1** to illustrate the extent of the potential noise.

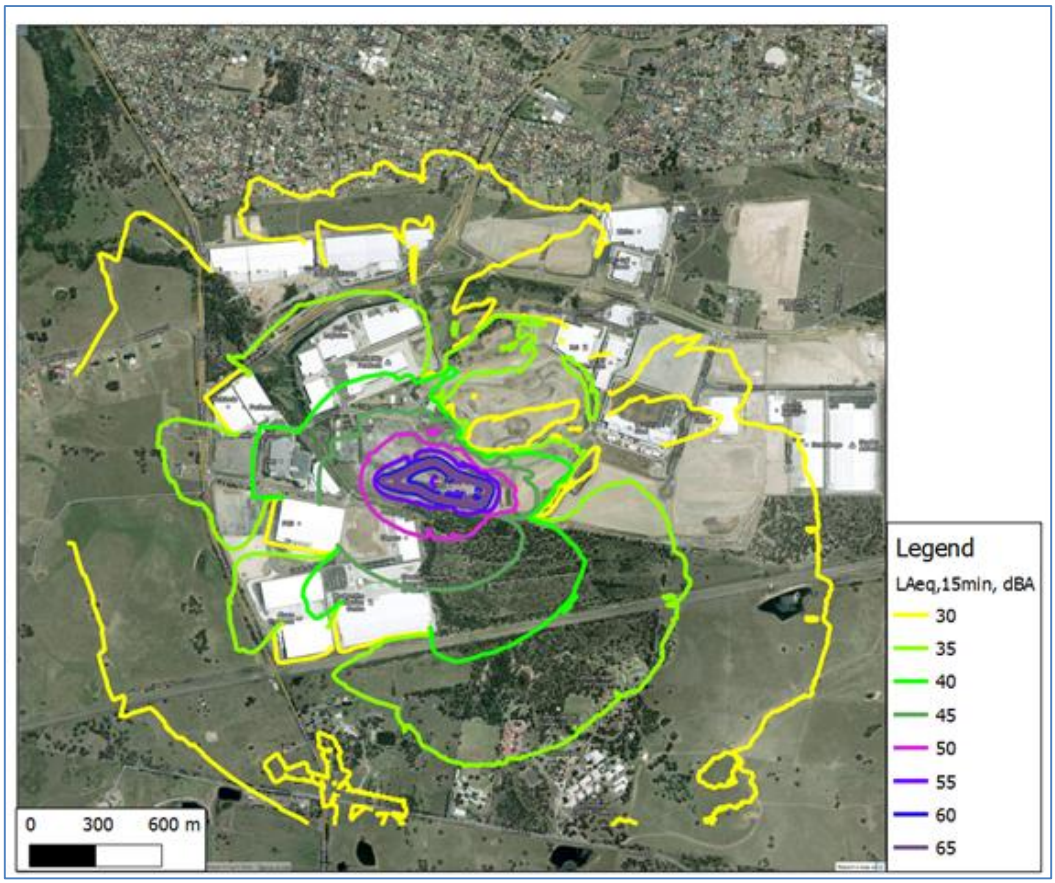


Figure 5-1: Predicted Night time Noise Contours

5.5 Reversing alarms and sleep disturbance

Predicted noise levels associated with truck and forklift reversing alarms have been predicted at identified residences, these are presented in **Table 5-2**.

Table 5-2: Predicted L_{Amax} Noise Levels at Night

Location number	Address	Predicted Noise Levels at Residence (dBA)	Night Noise Criterion L_{Amax} (dBA)	Compliance
4	654-674 Mamre Road, Kemps Creek	43	58	Yes
5	Mamre Road, Kemps Creek (Lot 34, DP1118173)	40	58	Yes
6	573-577 Mamre Road, Orchard Hills	41	58	Yes
7	539-571 Mamre Road, Orchard Hills	40	58	Yes
8	1-19 Mandalong Close, Orchard Hills	38	58	Yes
9	Verdi Glen, St Clare	29	50	Yes
10	2 Carcoar Close, Erskine Park	29	50	Yes
11	6 Ridgeview Crescent, Erskine Park	29	50	Yes

The predicted maximum noise levels presented in **Table 5-2** are well below the recommended night time sleep disturbance noise criteria.

5.6 Traffic Noise

The development will increase the traffic on the road network, potentially increasing traffic noise.

Analysis by Traffix Consultants indicate that the traffic generation of the site would be 10 trips (5 in, 5 out) during the morning peak hour and 16 trips (8 in, 8 out) during the evening peak hour.

The traffic to and from the development would approach the industrial area on Mamre Road, then leave Mamre Road at Erskine Park Road. Between Mamre Road and the development there are no noise sensitive receivers.

The current peak hour flows on Mamre Road (provided by Traffix) are shown in **Table 5-3.**

Table 5-3: Existing 2013 Traffic Counts at James Erskine Drive

Road Segment	AM peak	PM peak
North of James Erskine Drive	1960	1657
South of James Erskine Drive	1742	1466

5.6.1 Traffic Noise Criteria

The Road Noise Policy (RNP) sets out criteria for assessment of noise from vehicles on public roads. The RNP sets out noise criteria for 'arterial', 'sub-arterial' and 'local roads'.

Mamre Road is an arterial road. Criteria for "existing residences affected by additional traffic on arterial roads" are shown in **Table 5-4**.

Table 5-4: RNP Criteria

Road Category	Type of Project / Land Use	Assessment Criteria – dB(A)	
		Day (7am–10pm)	Night (10pm–7am)
Freeway / arterial / sub-arterial roads	Existing residences affected by additional traffic on existing arterial / sub-arterial roads generated by land use developments	LAeq15hr, 60 (external)	LAeq,9hr 55 (external)

Where predicted noise levels exceed the project-specific noise criteria, an assessment of all feasible and reasonable mitigation options should be considered. The RNP states that an increase of up to 2 dB represents a minor impact that is considered barely perceptible to the average person.

5.7 Traffic Noise Assessment

The traffic assessment concludes that the site would generate a maximum of 10 trips on Mamre Road in the AM peak hour, and 16 trips in the PM peak hour. Added to the existing flows shown in **Table 5-3**, this constitutes an increase in noise of less than 0.1dBA.

As noted in the RNP, an increase of 2dBA is considered barely perceptible. Hence an increase of 0.1dBA is a negligible impact.

This situation of a negligible effect would also be the situation outside of the peak times, when overall traffic noise levels would be lower.

6 CONSTRUCTION NOISE ASSESSMENT

6.1 Construction Noise Goals

The NSW EPA Interim Construction Noise Guideline (ICNG) recommends the following objectives:

Recommended standard hours of work -

- Monday to Friday 7.00am to 6.00pm
- Saturday 8.00am to 1.00pm
- No work on Sundays or Public Holiday

Noise goals are detailed in **Table 6-1**.

Table 6-1: Noise at Residences using Quantitative Assessment

Time of Day	Management Level $L_{Aeq,(15min)}$ *	How to Apply
Recommended Standard Hours: Monday to Friday 7am to 6pm Saturday 8am to 1pm No work on Sundays or Public Holidays	Noise affected RBL + 10dB(A)	• The noise affected level represents the point above which there may be some community reaction to noise. • Where the predicted or measured $L_{Aeq,(15min)}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to minimise noise. • The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
Recommended Standard Hours: Monday to Friday 7am to 6pm Saturday 8am to 1pm No work on Sundays or Public Holidays	Highly noise affected 75dB(A)	• The highly noise affected level represents the point above which there may be strong community reaction to noise. • Where noise is above this level, the proponent should consider very carefully if there is any other feasible and reasonable way to reduce noise to below this level. • If no quieter work method is feasible and reasonable, and the works proceed, the proponent should communicate with the impacted residents by clearly explaining the duration and noise level of the works, and by describing any respite periods that will be provided.
Outside standard hours	Noise affected + 5dB	• A strong justification would typically be required for works outside the recommended standard hours. • The proponent should apply all feasible and reasonable work practices to meet the noise affected level. • Where all feasible and reasonable practices have been applied and noise is more than 5dBA above the noise affected level, the proponent should negotiate with the community.

6.2 Schools & Hospitals

The applicable construction noise management levels for schools and hospitals are presented in **Table 6-2**. They apply to the noisiest 15-minute period from construction activity that coincides with the use of the school or hospital.

Table 6-2: Construction Noise Management Levels, $L_{Aeq,15min}$ dBA

Type of Receiver	Management Level, $L_{Aeq,15min}$ (applies when property in use)
School classroom	45 internal (55 external)[1]
Hospital Ward internal	45 internal (55 external)[1]
Playground	60 external

Note 1: External management levels not specified by EPA. These external levels determined by assuming 10dBA loss from outside to inside, which allows for a ventilated façade.

For assessment purposes, it is generally assumed noise internally would be attenuated by 10dBA by the façade (assuming open windows), giving an external criterion of 55 dBA for classrooms. This will be used as the construction noise management level for schools in this assessment.

6.3 Management Levels

The management levels specific to this proposal are shown in **Table 6-3**, based on the measured RBLs for residences, and EPA recommendations for non-residential sites.

Table 6-3: Construction Noise Management Levels, $L_{Aeq,15min}$ dBA

Location No.	Address	Daytime	Night Time
1	Catholic Health Care Services	55	55
2	Emmaus Catholic College, Trinity Catholic Primary School	55	n/a
3	Mamre Anglican School	55	n/a
4	654-674 Mamre Road, Kemps Creek	57	48
5	Mamre Road, Kemps Creek (Lot 34, DP1118173)	57	48
6	573-577 Mamre Road, Orchard Hills	57	48
7	539-571 Mamre Road, Orchard Hills	57	48
8	1-19 Mandalong Close, Orchard Hills	46	40
9	Verdi Glen, St Clare	46	40
10	2 Carcoar Close, Erskine Park	46	40
11	6 Ridgeview Crescent, Erskine Park	46	40

n/a – Not applicable as the school does not operate at night.

6.4 Proposed Working Hours

In accordance with the ICNG some construction works are typically restricted to the hours of:

- Monday to Friday 7.00am-6.00pm
- Saturday 8.00am-1.00pm
- No construction work is to take place on Sundays or Public Holidays

Subject to detailed construction planning, some movement of heavy vehicles may be required in the hour 6.00am to 7.00am on some days.

This may not be frequent; however, it will be assessed against the night time criteria.

6.5 Description of Works

The following stages detail the methods of construction and anticipated equipment usage.

6.5.1 Stage 1: Detailed Earthworks

This will involve precise contouring of the site from the initial bulk excavation levels to produce the final shape of the site, suitable for the placement of drainage systems (both civil and sewer), concrete (internal and external) and asphalt (external).

- Construction Trades: Civil Earthworks

6.5.2 Stage 2: Installation of Drainage Systems

This will involve the establishment of the extensive in ground drainage systems located under the buildings. These systems convey liquid waste (predominantly water) away from the buildings to separate facilities where it is treated and the quality ameliorated suitable for discharge from the site.

During rain events, building roof and impermeable pavement run off is conveyed via a new pit and in ground pipe network to a common location on site. This water is then discharged from the site in a flow controlled manner.

- Construction Trades: Plumbing, Civil Drainage

6.5.3 Stage 3: Assembly of Structures & External Cladding

This will involve the assembly of approximately 400 tonnes of structural steel comprising individual columns, beams and trusses to form the building superstructure. The columns will be established on the piles which were constructed during the Early Works. These piles are modified to include capped concrete pads into which bolts have been cast. The columns will be locked down onto these bolts.

The building roof is then laid in order to stabilise the structure and also provide a protected working environment. Architectural fascia cladding is also added to further weather proof the building.

The ground and mezzanine levels will feature in situ concrete floors, which form the working platforms on which future equipment is installed.

- Construction Trades: Roof Plumbers, Concreters, Steel Fabricators & Assembly Riggers.

6.5.4 Stage 4: Internal Factory Space / Room Construction

This will involve the establishment of internal walls within the main factory building. The building will be divided up internally with walls, creating separate work spaces. Some of these work spaces will be climate controlled for food production and storage purposes, while others will be air-conditioned for general occupancy or ambient for general warehousing needs.

Wall construction generally comprises preformed insulated inter-lockable panels, commonly known as sandwich panel. These will be on top of the in-situ concrete floors. Where ambient conditions are required perimeter concrete walls will form the areas.

The food production and storage rooms are capped with the same material which forms the ceilings. This panel is suspended by means of cabling from the steel superstructure above. This internal ceiling also forms a pedestrian trafficable workspace above the rooms below. This zone is used to house items

of plant, equipment, pipe work and services reticulated systems throughout the factory, with "service droppers" penetrating the ceilings to service the work areas.

- Construction Trades: Carpenters

6.5.5 Stage 5: Reticulation of Utility Services

This will involve the reticulation of utility services including electricity, telecommunications, gas and water. The process of producing packaged market milk requires the transformation of raw ingredients in to food safe finished products which are then packaged into convenient consumer sized packs.

This is achieved using specialised processing equipment and storage techniques. These are driven and maintained using electricity and water (hot and cold). Secondary utilities including refrigeration, compressed air and steam which are also vital to operate the factory are generated on site using electricity and natural gas.

As such these primary utility services are brought into the site underground to central points from where they are distributed to the wide variety of end user requirements. Most services are hidden in the space between the main structural roof and the work space ceiling below. They are distributed neatly along predesigned cable tray routes and pipe gantry systems.

6.5.6 Stage 6: Installation of Passive Services

This will involve the installation of passive services such as fire detection and prevention systems and secondary services reticulation. The buildings will also feature passive utility based systems which are not directly associated with the manufacturing processes. Most commonly these include fire early detection and suppression systems such as smoke detectors, factory exhaust, sprinklers, fire hydrants and hose reels.

- Construction Trades: Electricians, Plumbers (Various)

6.5.7 Stage 7: External works

This will involve developing the areas external to the factory buildings to allow operation of the facility including access for vehicles, refrigerated trucks and milk tankers.

A network of concrete pits with underground interconnected pipe work is constructed to convey rain water away from the buildings and trafficable areas. This water is deemed clean and can be safely discharged to the local municipal storm water drainage system.

Internal roadways and small vehicle parking zones are bounded by concrete kerbing with asphalt wearing courses. Areas where heavy or large vehicle park or turn requires a more durable pavement type which is constructed from concrete.

Light duty pedestrian access only walkways are constructed from concrete.

- Construction Trades: Concreters, Civil Drainage Plumbers, Specialised Asphalters

6.5.8 Stage 8: Landscaping and fencing

The final building works phase of construction is to make good to the rest of the unimproved site and secure the whole premises for traffic management and general public access control. Internal soft and hard landscaping materials are placed to infill unused areas of the site and to architecturally conceal and soften the general appearance of the facility.

A whole perimeter chain mesh fence incorporating segregated in and out bound drive ways complete with gated access control locations are constructed adjacent to the road accessible boundary in Quarry Road.

- Construction Trades: Landscape Gardeners, Security Contractors

6.6 Source Noise Levels

Typical source noise level of typical construction equipment which would be used on the site are shown in **Table 6-4**. No impact piling is proposed at the site.

Table 6-4: Typical Construction Plant Sound Levels

Plant	Sound Power Level (dBA)	Sound Pressure Level at 7m (dBA)
Front End Loader	111	86
Grader	107	82
Smooth Drum Roller	107	82
Spoil, Materials or Concrete Truck	109	84
Tower Crane or Mobile Crane	105	80
Truck-mounted Shotcrete Pump	106	81
Excavator or Bobcat	107	82
Concrete Pump	105	80
Concrete Vibrator	103	78
Concrete Cutter	109	84
Large Bored Drilling Rig	112	87
Small Bored Drilling Rig	108	83
Powered Hand Tools	109	84
30t Excavator operating with Hydraulic Hammer	122	97
Forklift	106	81
Mulcher	106	81
Articulated Dump Truck	113	88
Handheld Jackhammer	113	88
Air Compressor (Power Tools)	98	73
Asphalt Paving Plant	114	89

6.7 Noise Modelling

At each of the stages listed, different sets of equipment will be used. The worst case noise emission will be from Stages using many items of heavy equipment. **Table 6-5** shows the mix of equipment used at different stages.

Table 6-5: Calculation of Total Sound Power Level (SWL)

Activity	Typical Equipment Used	Typical Site $L_{Aeq,15min}$ Sound Power Level (SWL)
Stage 1, 2 – Earthworks & Drainage	Road Trucks, Compactor, Grader, Steel, multi tyred and Vibratory Rollers, Concrete pour, including Trucks and Concrete Vibrator, Asphalt paving plant, Backhoe, Sweeper, Compressors, Generators, (Excavator with hammer)	122[1] (127 with hammering)
Stage 3 – Main Building Construction	Cranes, hand tools, material trucks, forklift	113
Stage 4, 5, 6		Internal work
Stage 7 – Paving	Road Trucks, Compactor, (Jackhammers), Steel, multi tyred and vibratory Rollers, Concrete Pour, including Trucks & Concrete Vibrator, Asphalt paving plant, Backhoe, Sweeper	121
Stage 8 – Landscaping	Excavator/Bobcat, Powered Hand Tools, Air Compressor, Spoil, Material or Concrete truck	110

Note 1: Assumes 5 dump or concrete trucks in 15-minute period.

To assess noise emission from construction activities, the CadnaA noise model was used. The three noisiest stages are Stage 1, Stage 3 and Stage 7.

The noise emission was predicted from the following scenarios:

- Stage 1 — 5 trucks enter and leave the site in 15 minutes; and,

  4 excavators operate continuously at different areas of the site continuously (with and without rock breaker)

- Stage 3 — 5 trucks enter and leave the site in 15 minutes; and,

  4 cranes work around the building continuously;

- Stage 7 — Two concrete trucks, two excavators and two paving machines operate continuously.

During each of these scenarios there will be other activities occurring, however in general the noise output would be dominated by the output of the heavy machinery listed.

The results of the scenarios are listed in **Table 6-6**. Noise is predicted to comply at all residences for all construction stages, including during the 6.00am to 7.00am period when the night time criterion is used for assessment.

Table 6-6: Predicted Construction Noise Levels

Location No.	Address	Daytime				Criteria		
		Stage 1	Stage 1 with Rock Hammers	Stage 3	Stage 7	Daytime	Night Time (6am -7am)	Complies?
1	Catholic Health Care Services	40	45	31	40	55	55	Yes
2	Emmaus Catholic College, Trinity Catholic Primary School	40	45	31	39	55	n/a	Yes
3	Mamre Anglican School	40	45	30	39	55	n/a	Yes
4	654-674 Mamre Road, Kemps Creek	30	35	21	29	57	48	Yes
5	Mamre Road, Kemps Creek (Lot 34, DP1118173)	29	34	19	28	57	48	Yes
6	573-577 Mamre Road, Orchard Hills	37	42	28	37	57	48	Yes
7	539-571 Mamre Road, Orchard Hills	29	34	20	28	57	48	Yes
8	1-19 Mandalong Close, Orchard Hills	26	31	17	26	46	40	Yes
9	Verdi Glen, St Clare	25	30	17	25	46	40	Yes
10	2 Carcoar Close, Erskine Park	22	27	14	22	46	40	Yes
11	6 Ridgeview Crescent, Erskine Park	20	25	11	20	46	40	Yes

n/a – Not applicable as the school does not operate at night.

7 VIBRATION

The site activity would be more than 100m from any industrial building, and more than 500m from any residence or other noise sensitive building.

There are no significant vibration sources proposed. There will be no blasting or impact piling.

In this situation, vibration from the site will be imperceptible at any building or residence, and therefore would be below all normally applicable criteria.

8 CONCLUSION

Noise from the proposed milk processing facility at Erskine Park has been assessed.

Noise from operations is predicted to comply with the EPA *Industrial Noise Policy* guidelines and hence no noise impact is predicted.

Noise from traffic generated by the site would be negligible, contributing approximately 0.1 dBA to existing traffic noise levels. Note that a change in noise level of 2 dBA is barely perceptible.

Sleep disturbance in residential areas is also unlikely to be an issue, given that these areas are approximately 1 km away from the site.

Noise from construction will be within the EPA guidelines and no vibration impact is predicted.

On this basis it can be concluded that there is no potential acoustic impact likely to arise at any receptors as a result of the Project, and that all applicable criteria would be met.

9 REFERENCES

NSW Industrial Noise Policy, NSW Environment Protection Authority, 2000

NSW Road Noise Policy, NSW Environment Protection Authority, 2011

NSW Interim Construction Noise Guideline, NSW Environment Protection Authority, 2009

Appendix A

Noise Measurement Results

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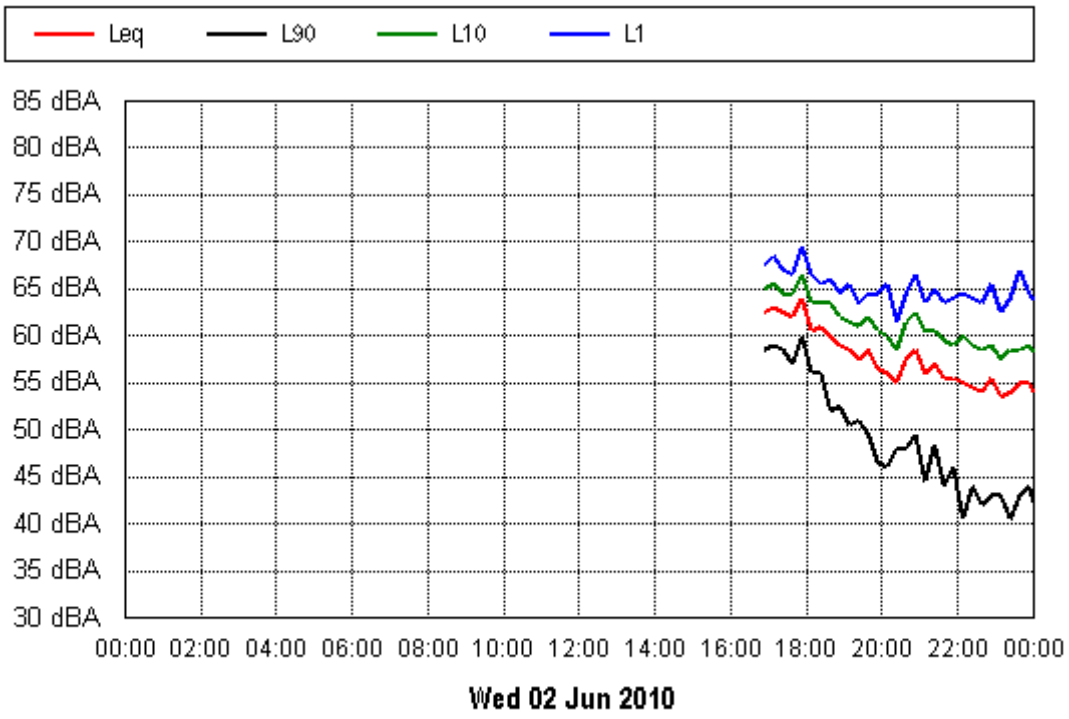
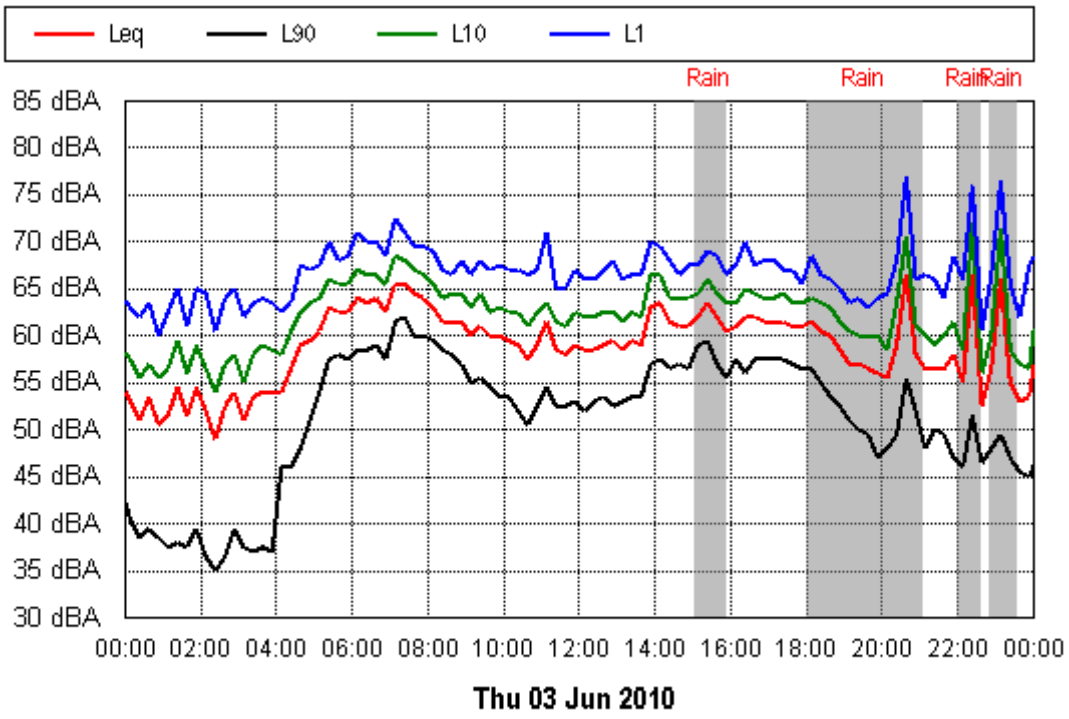
Location: 657 Mamre Road





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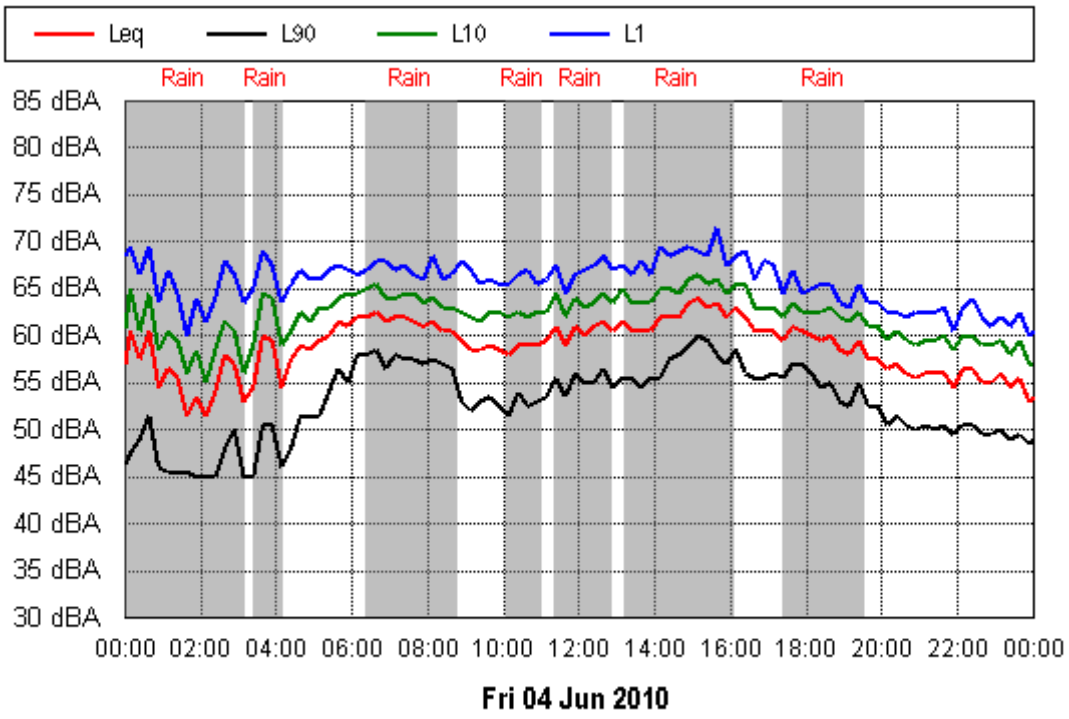
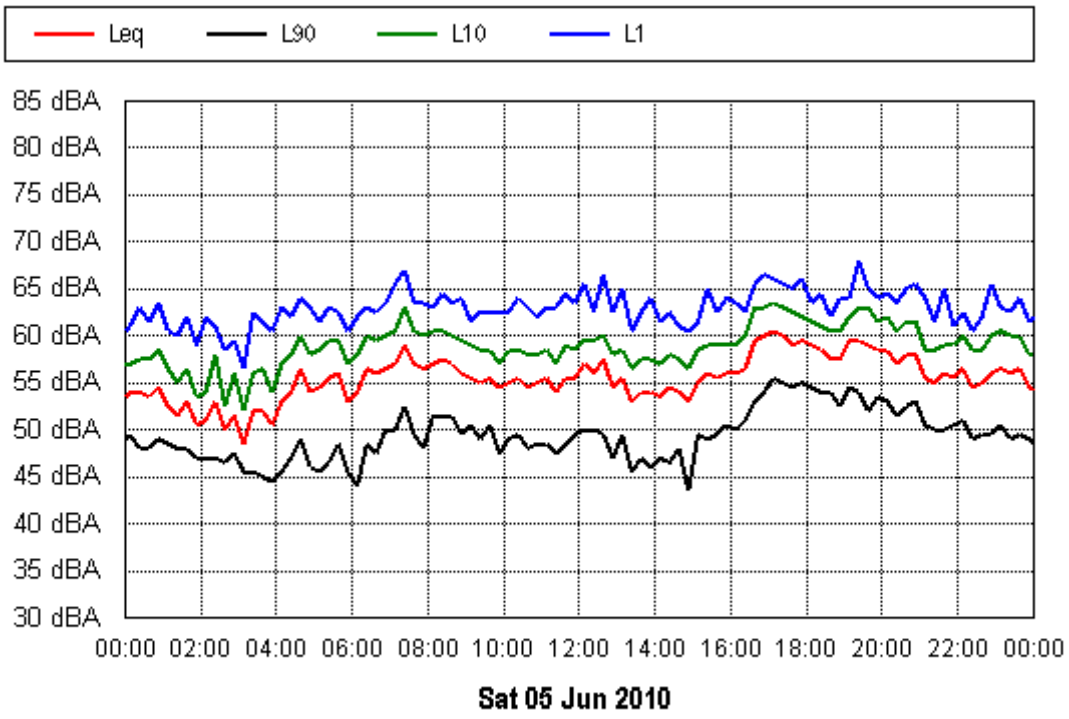
Location: 657 Mamre Road





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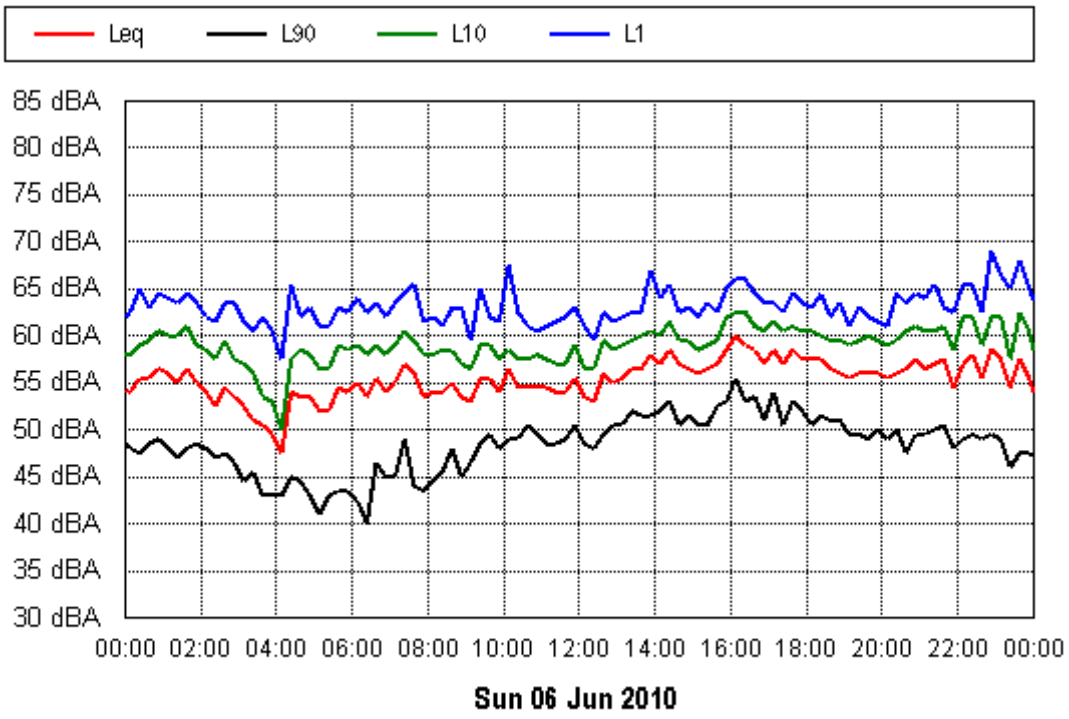

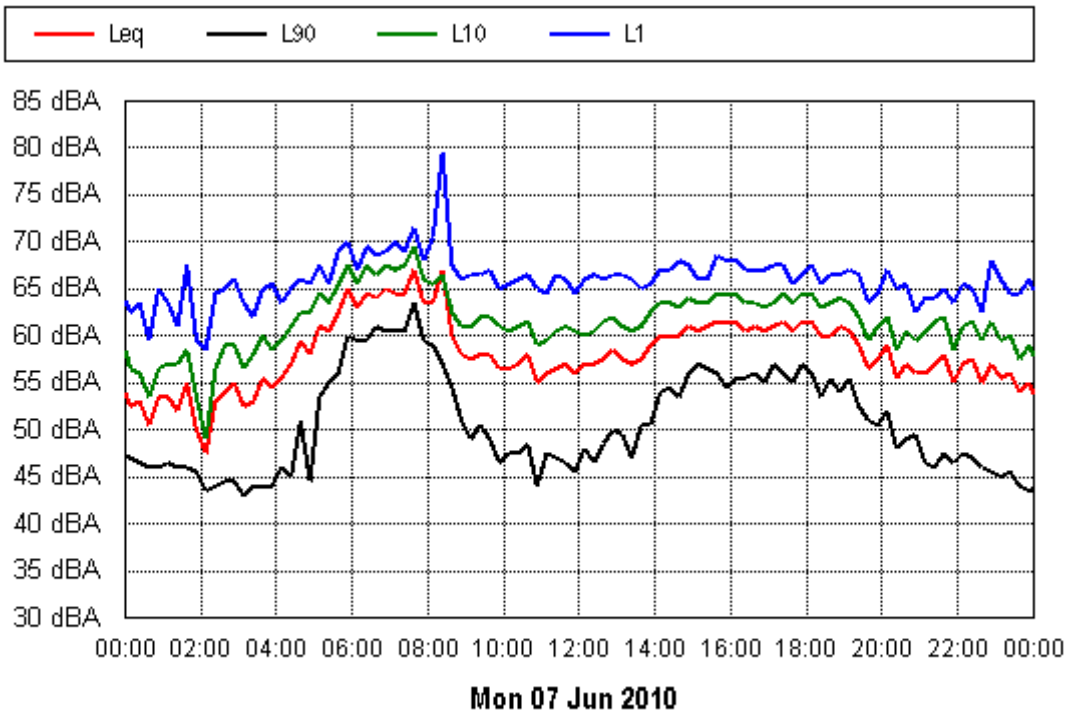

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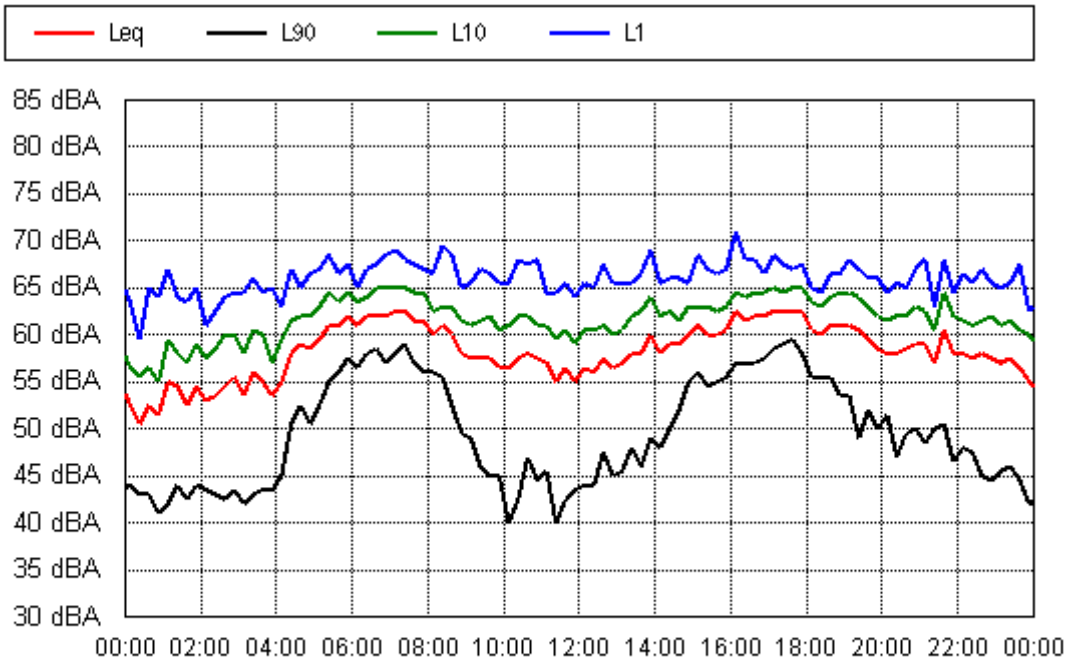
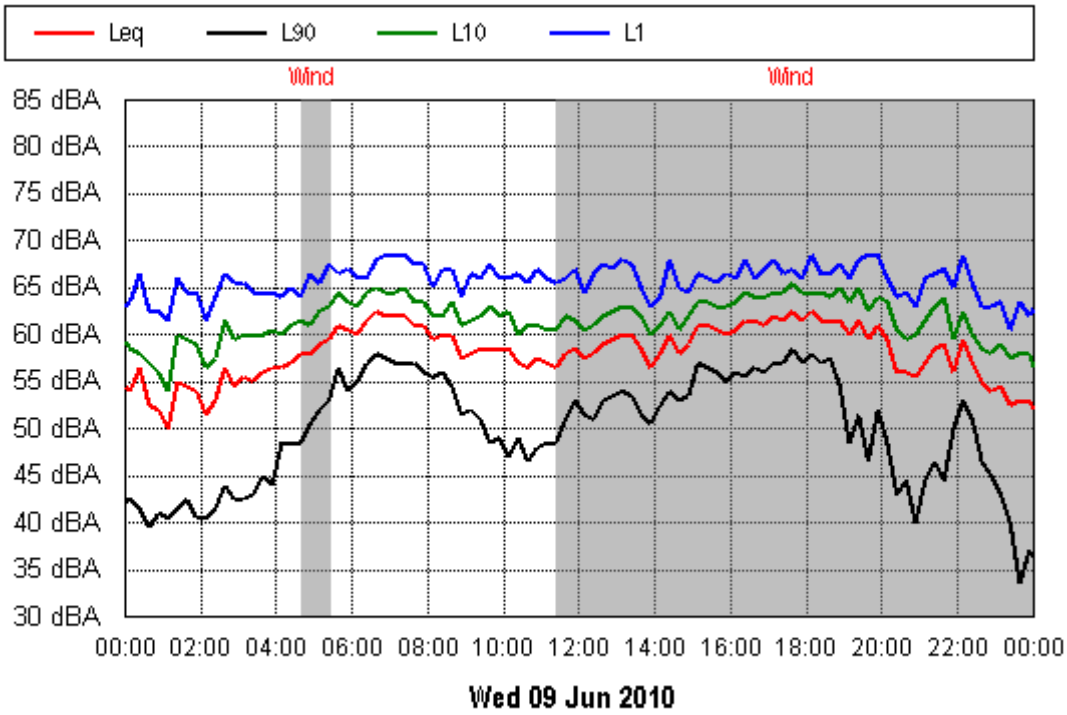
Location: 657 Mamre Road





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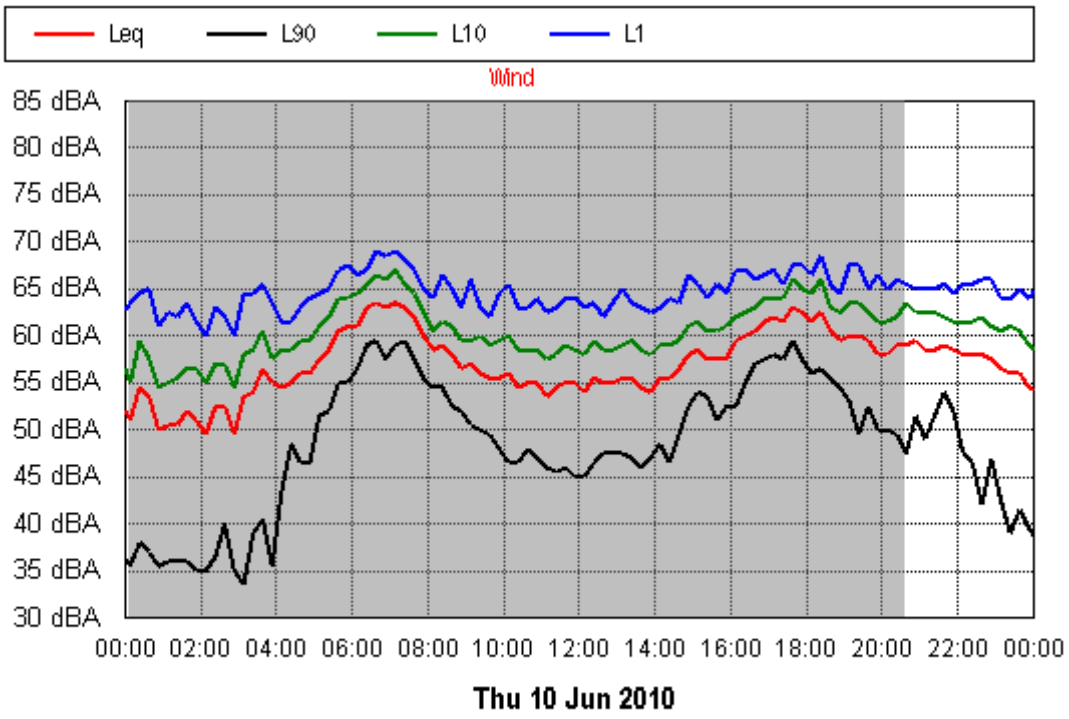

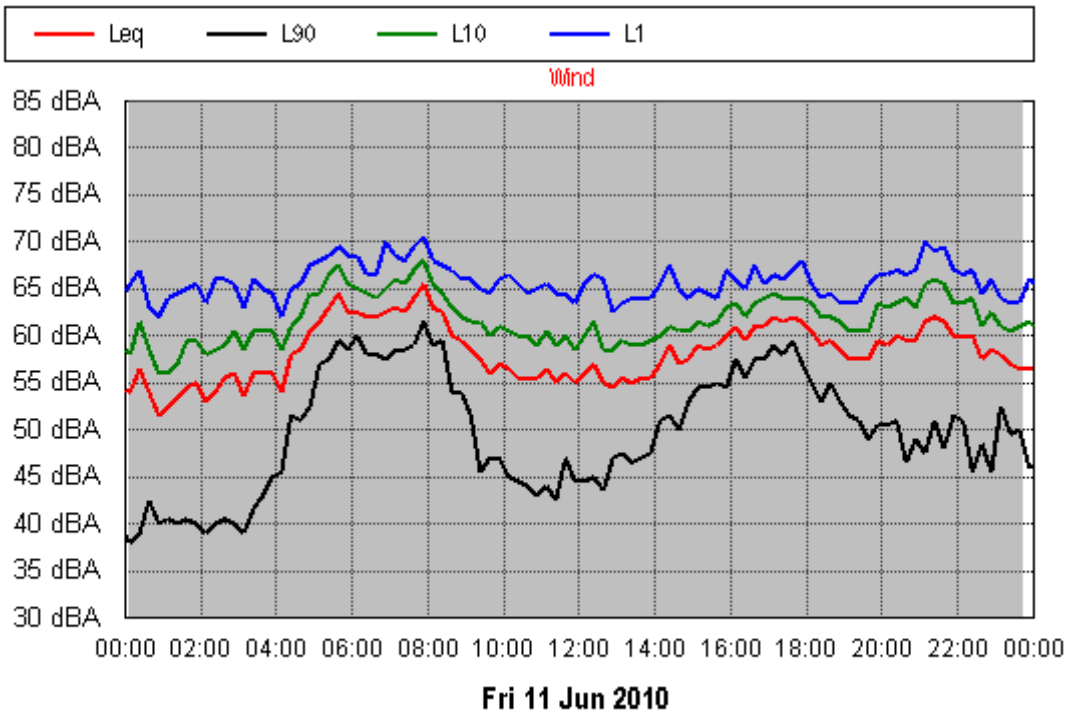

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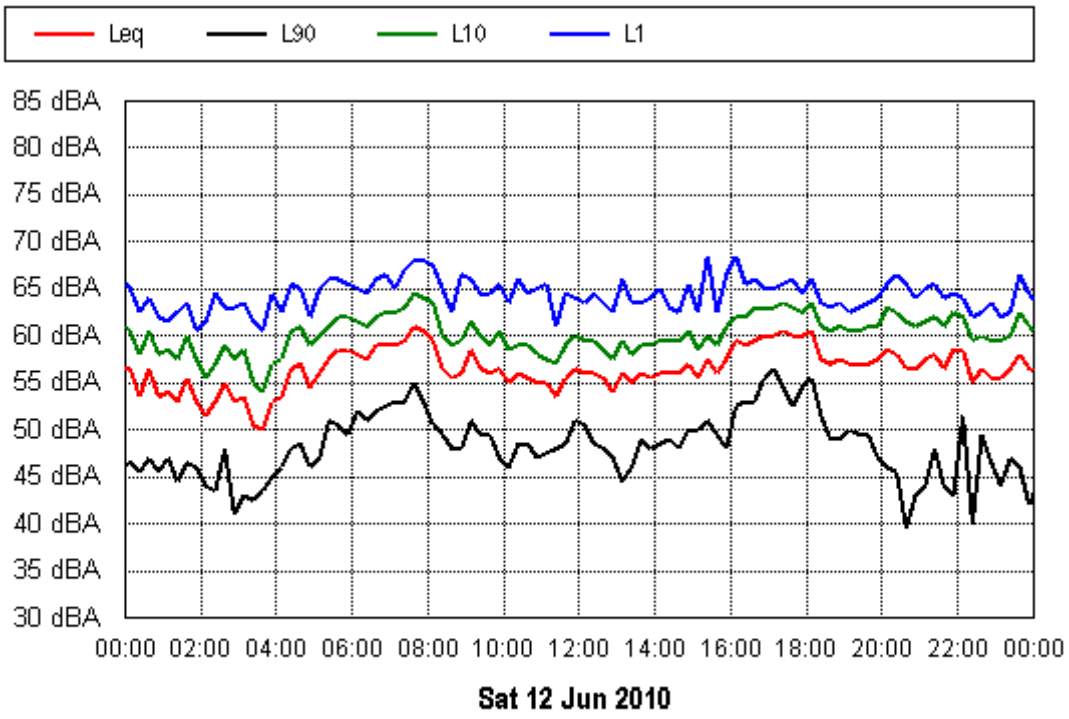

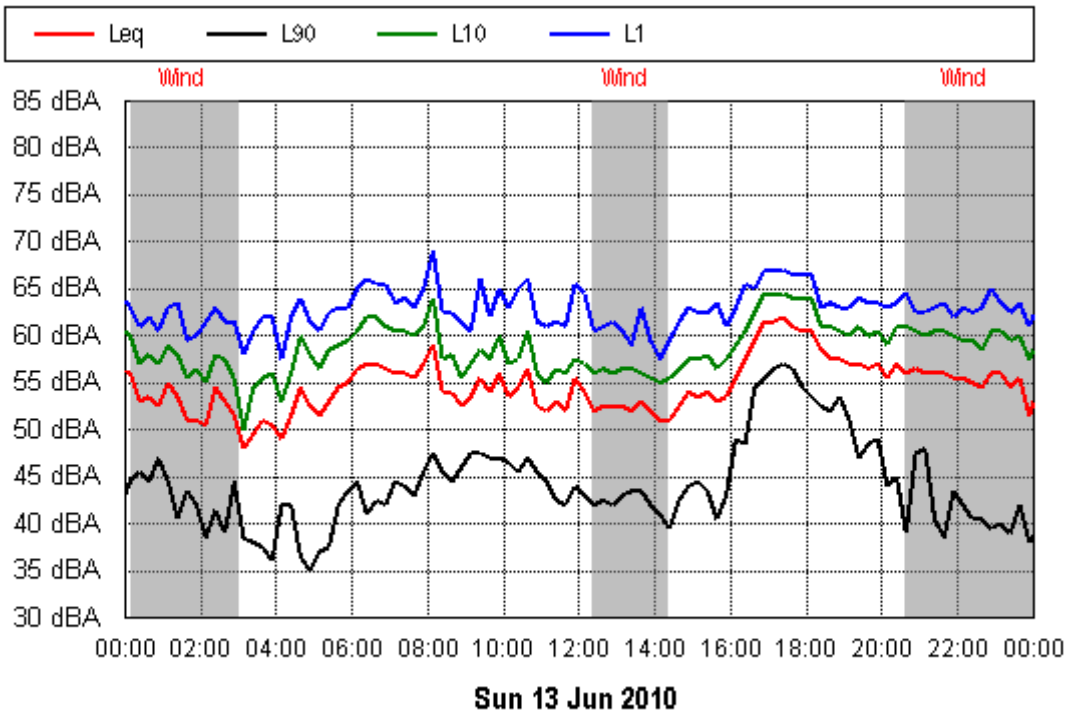

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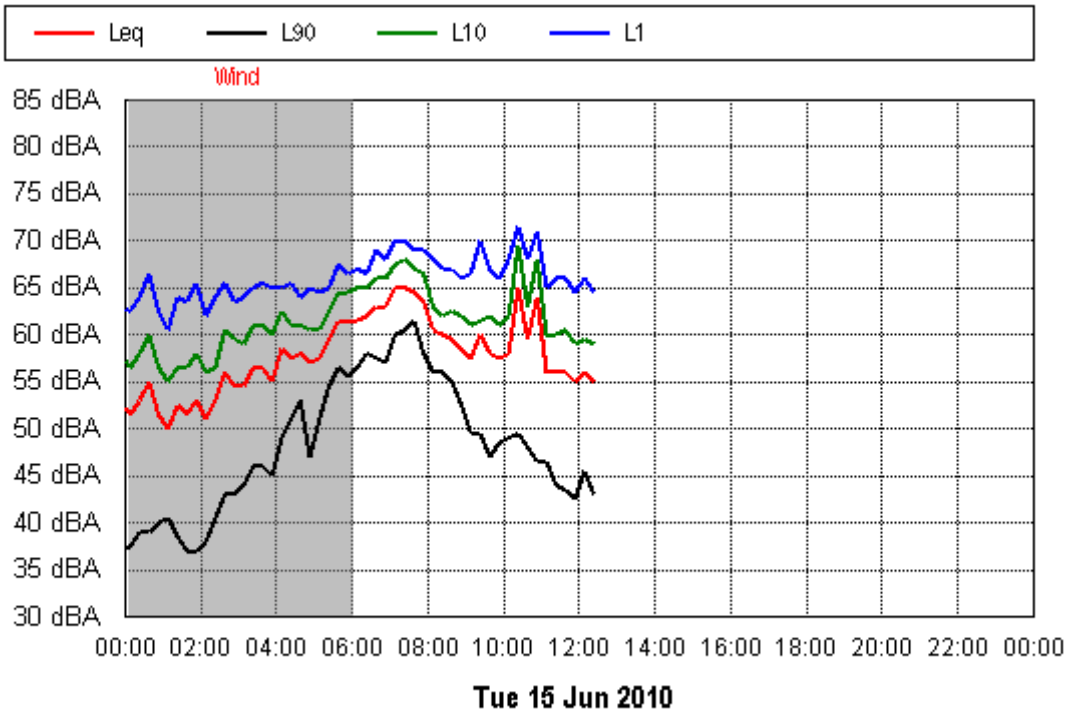

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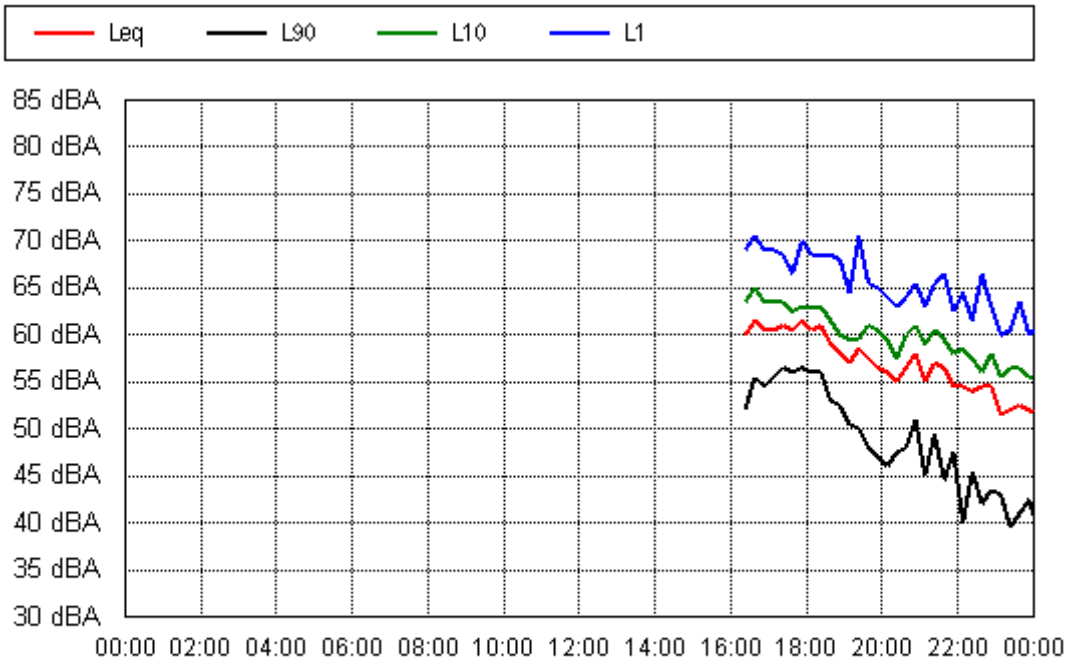

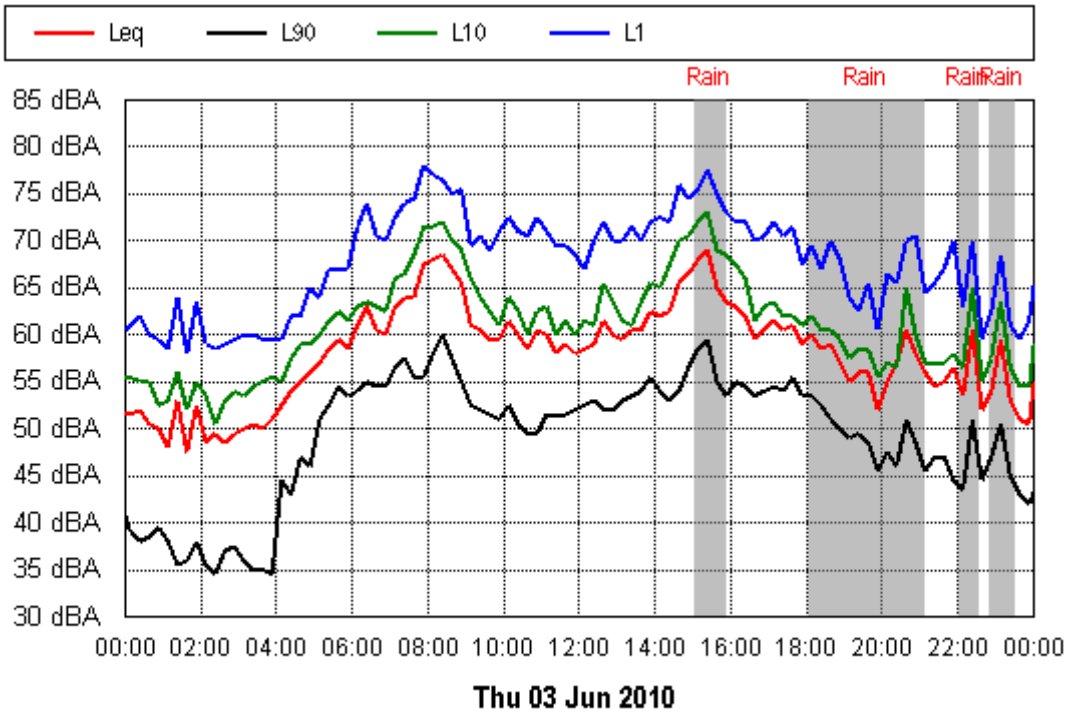

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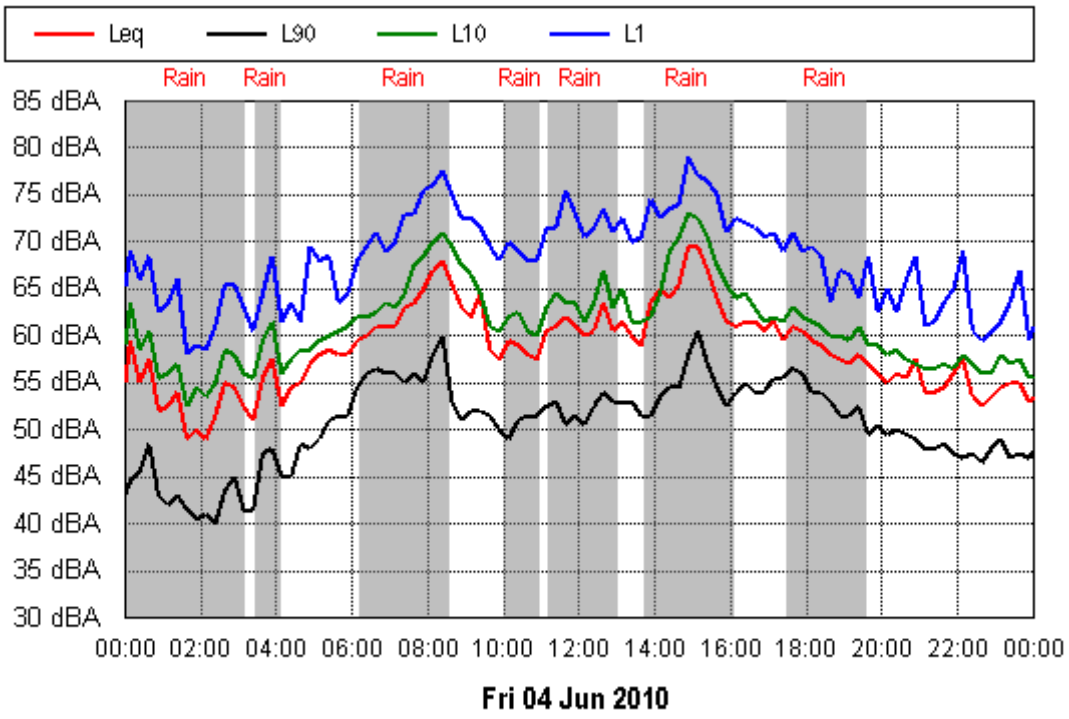

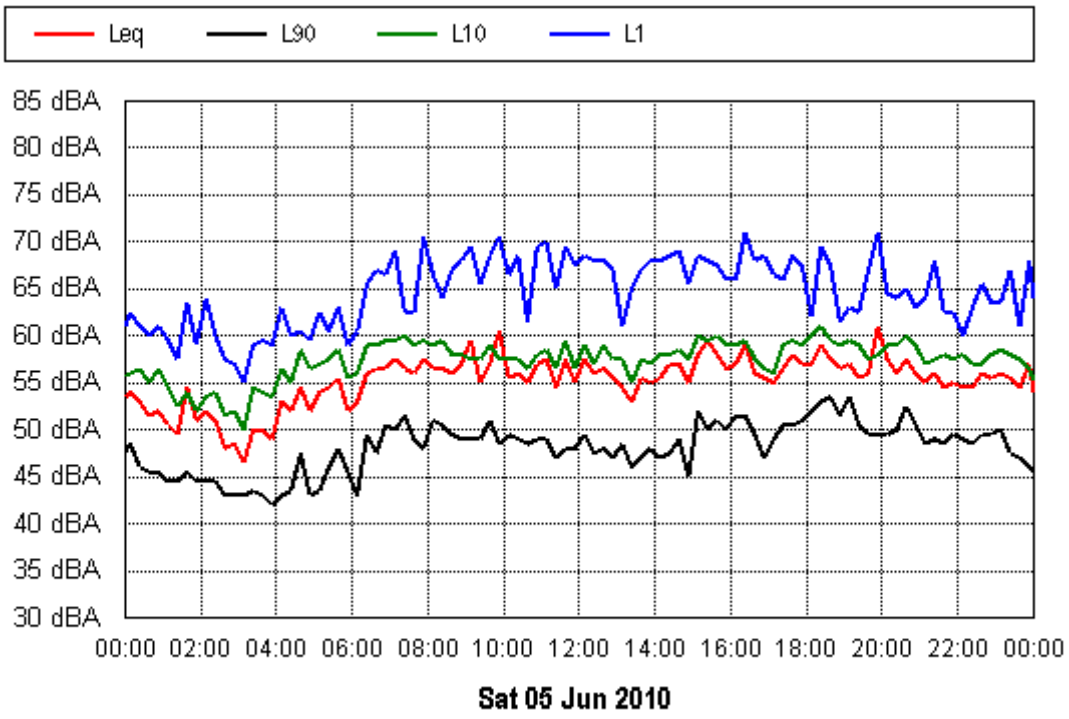

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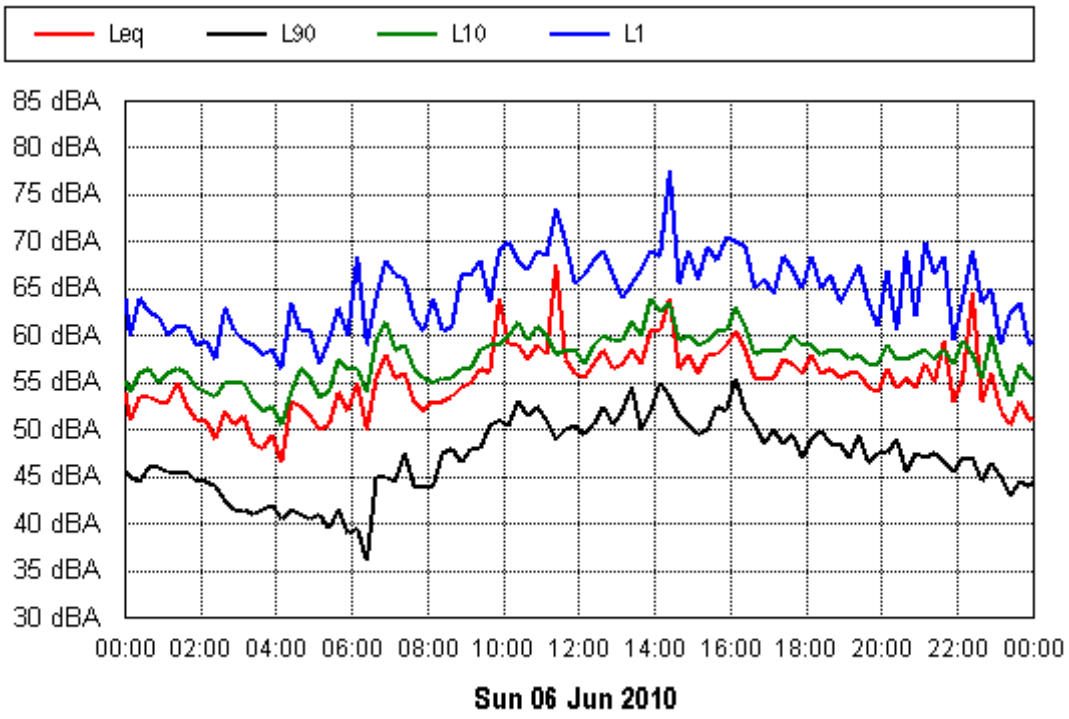

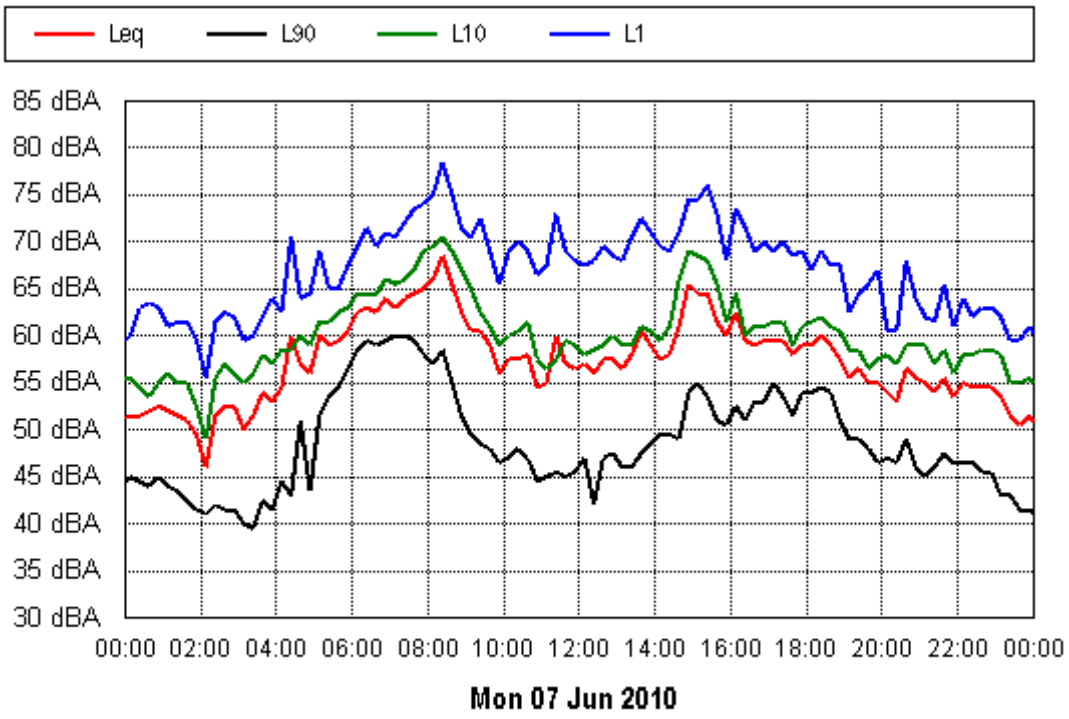

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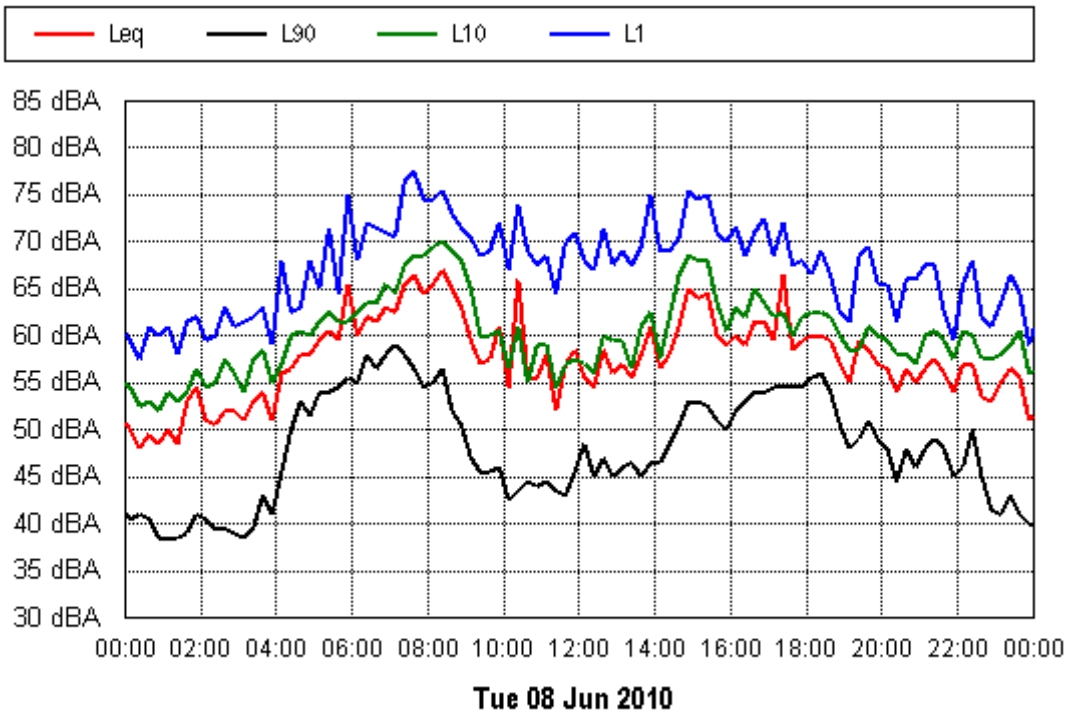

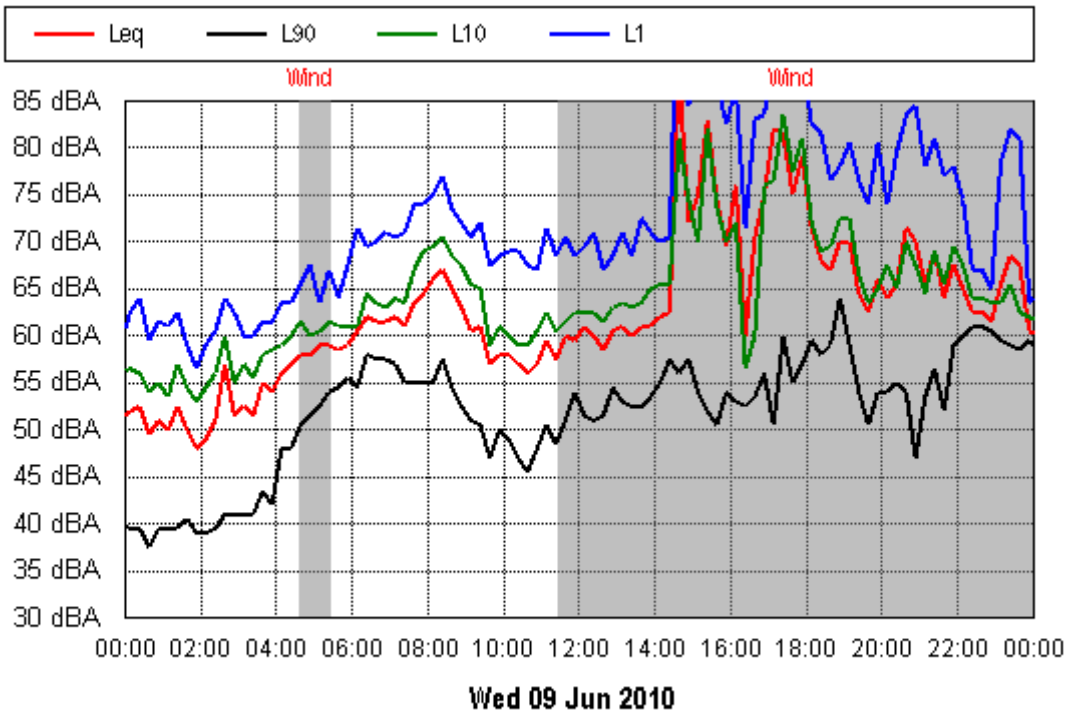

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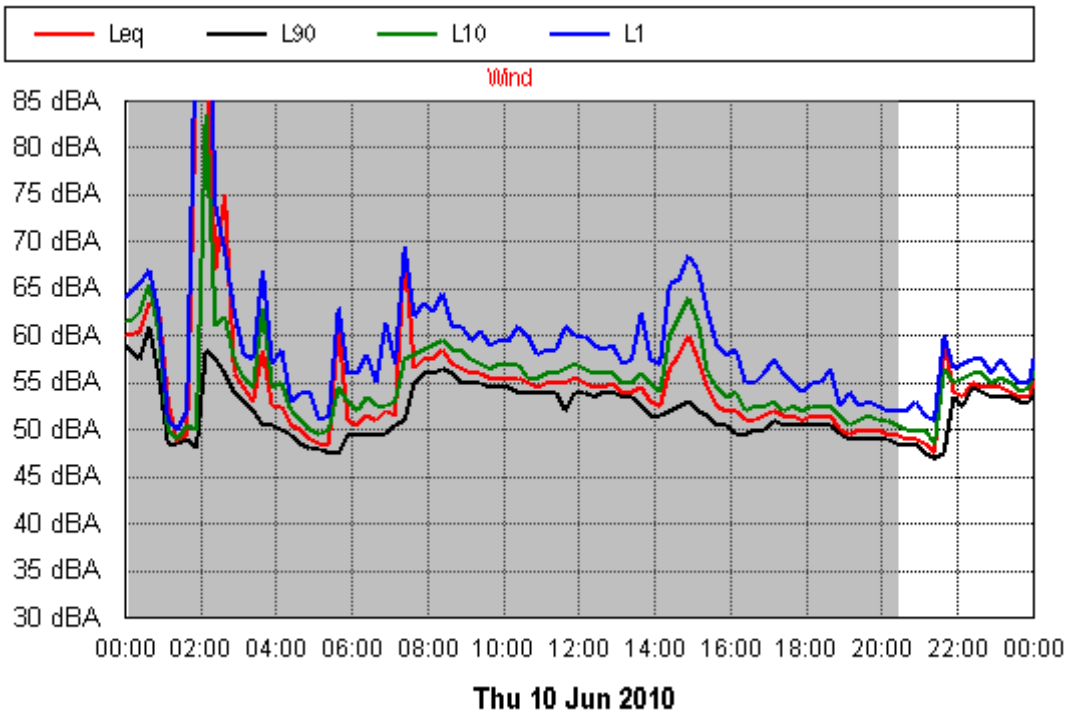

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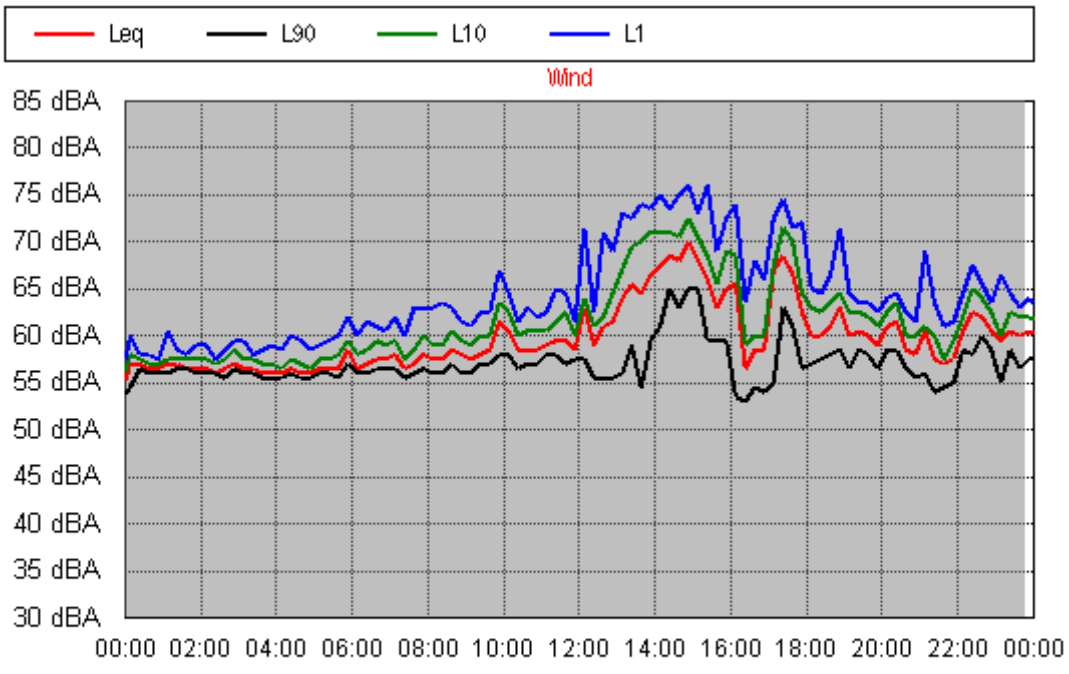

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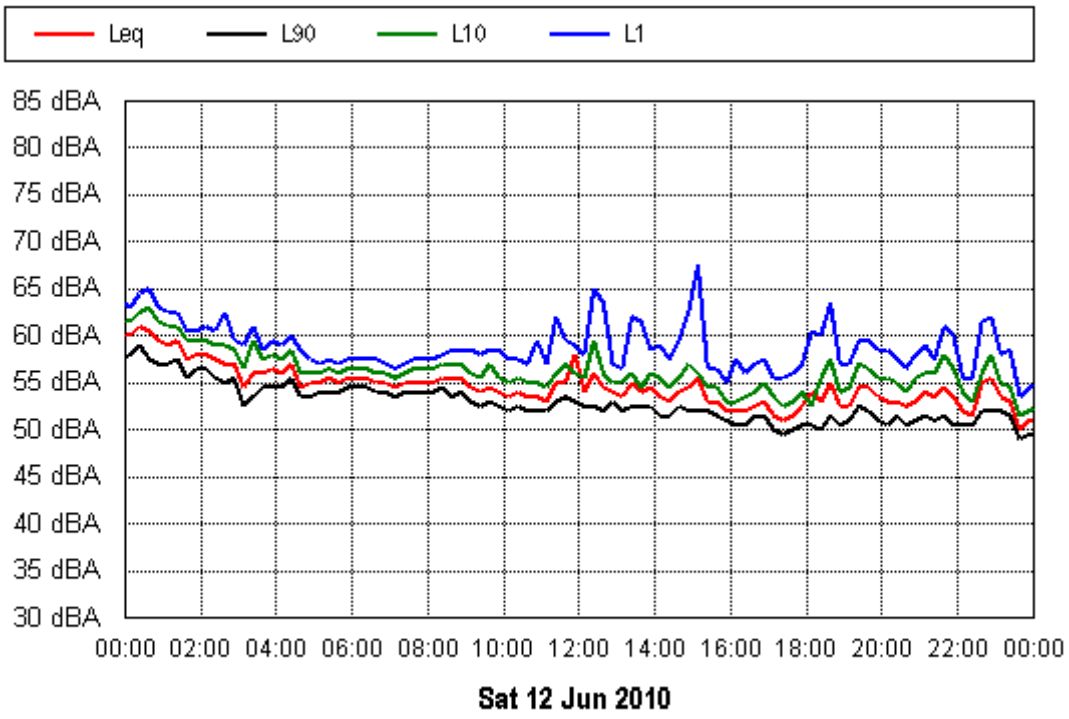
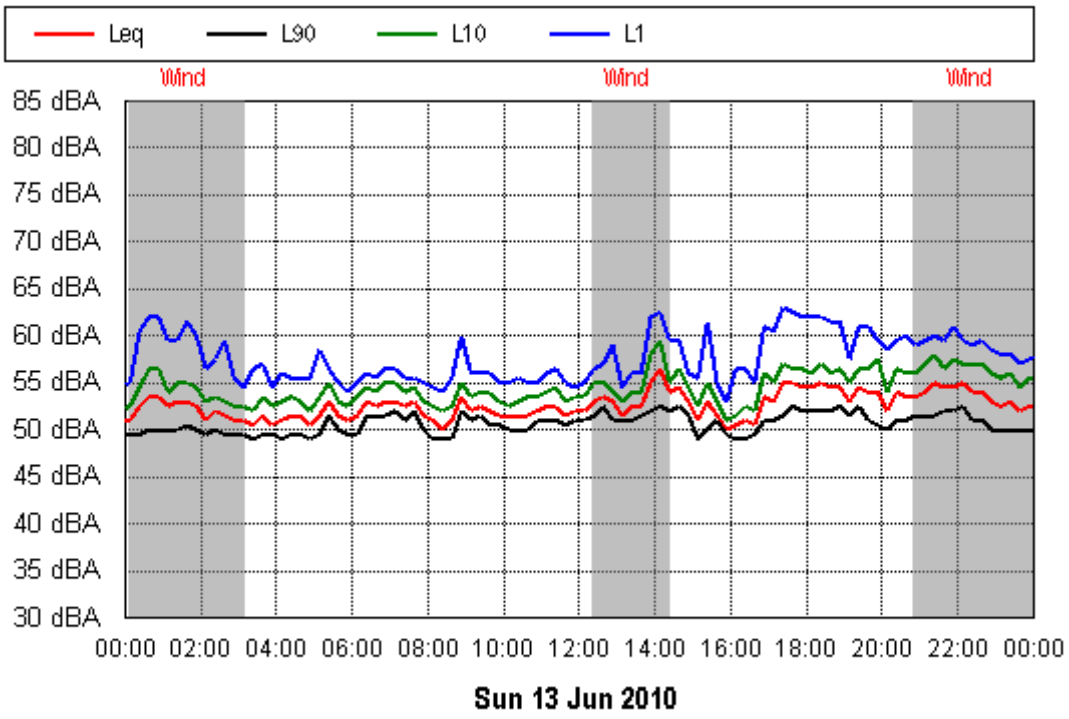
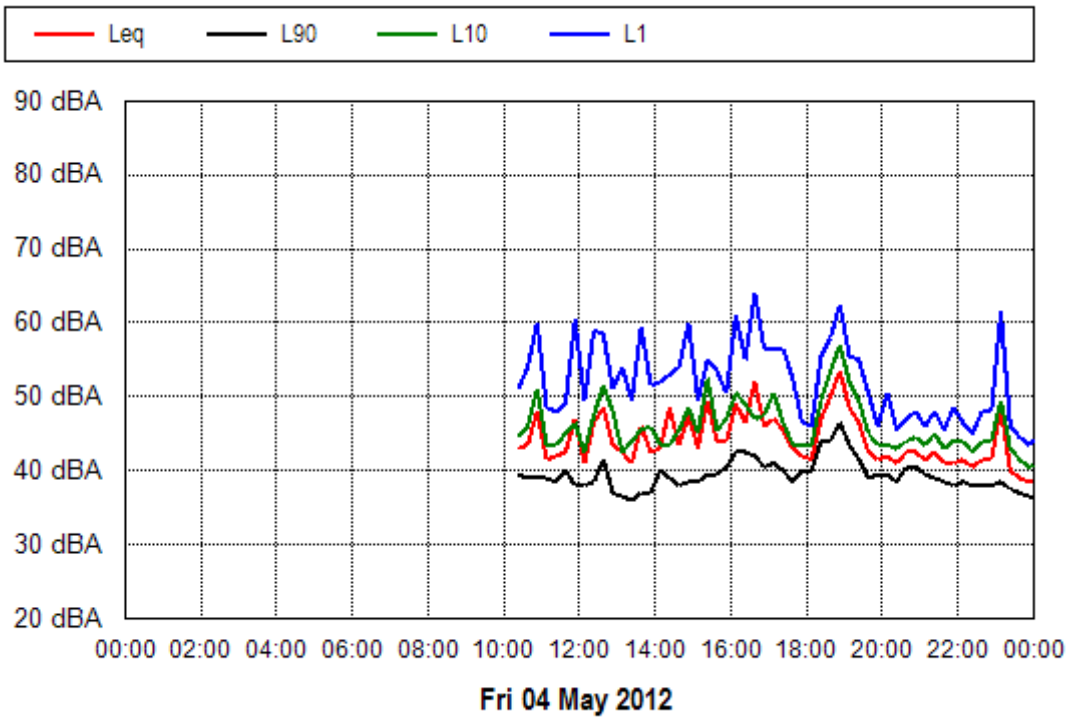
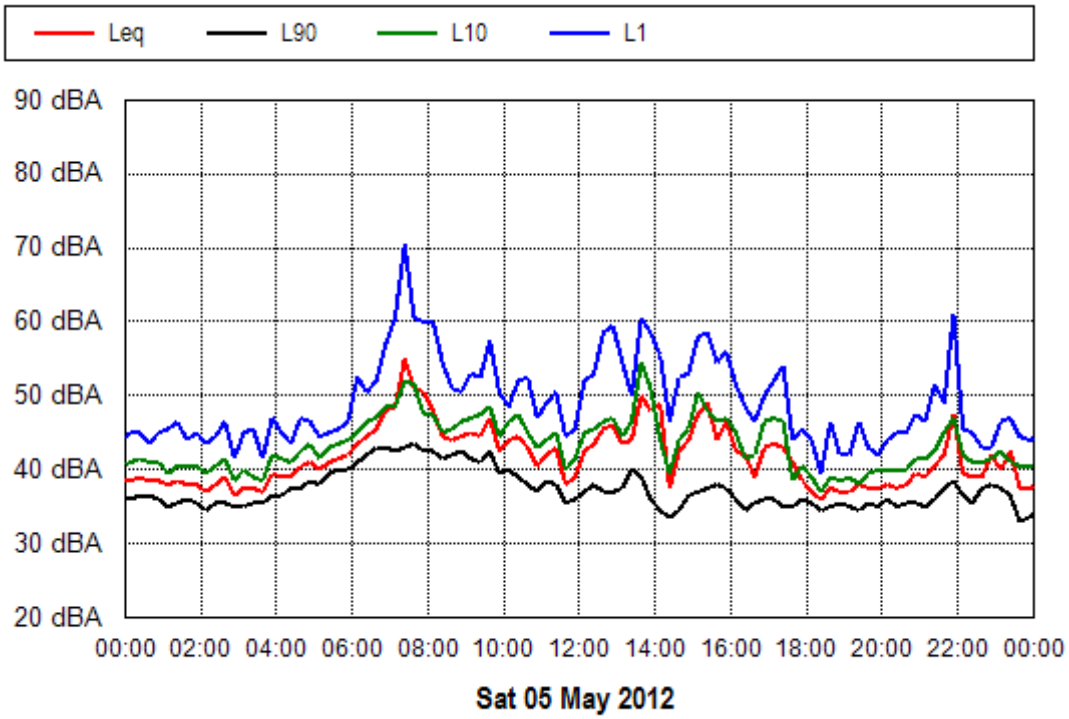




Project: DAIRY PROCESSING PLANT Erskine Park
Location: Backyard of 5 Bally Leaney Place





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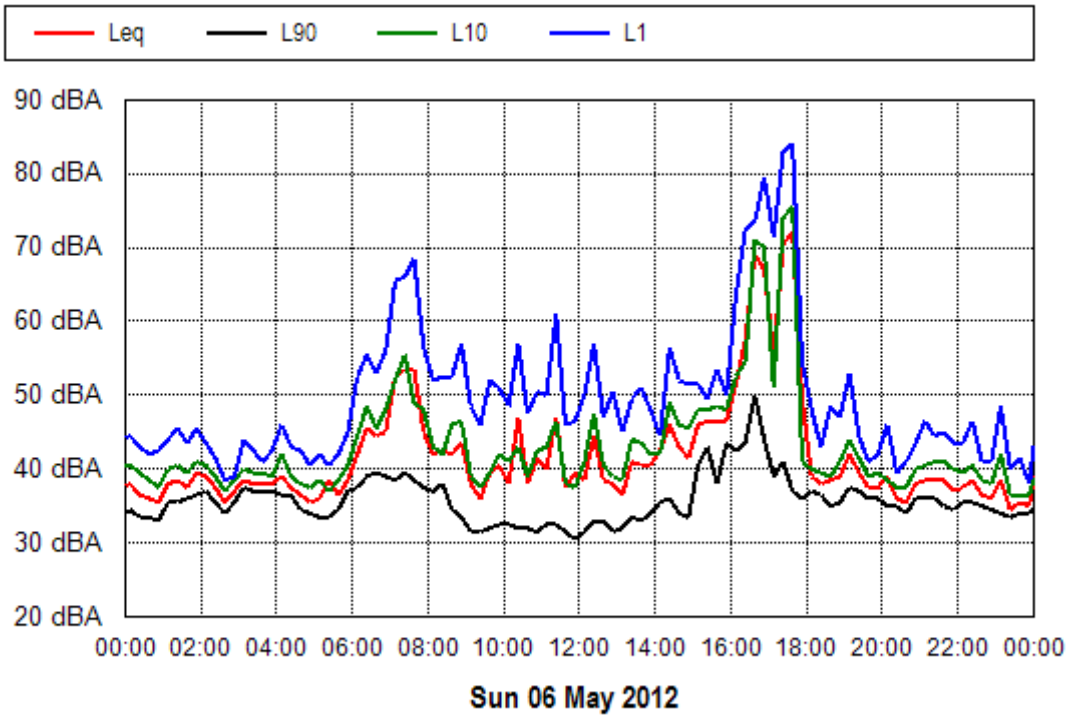

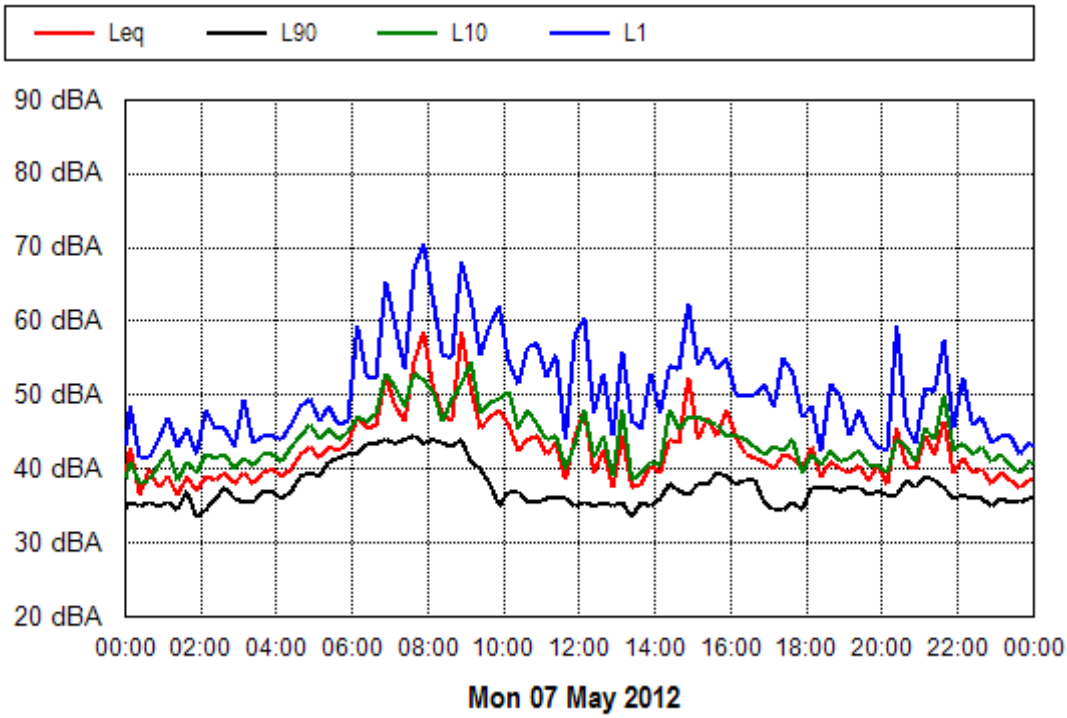

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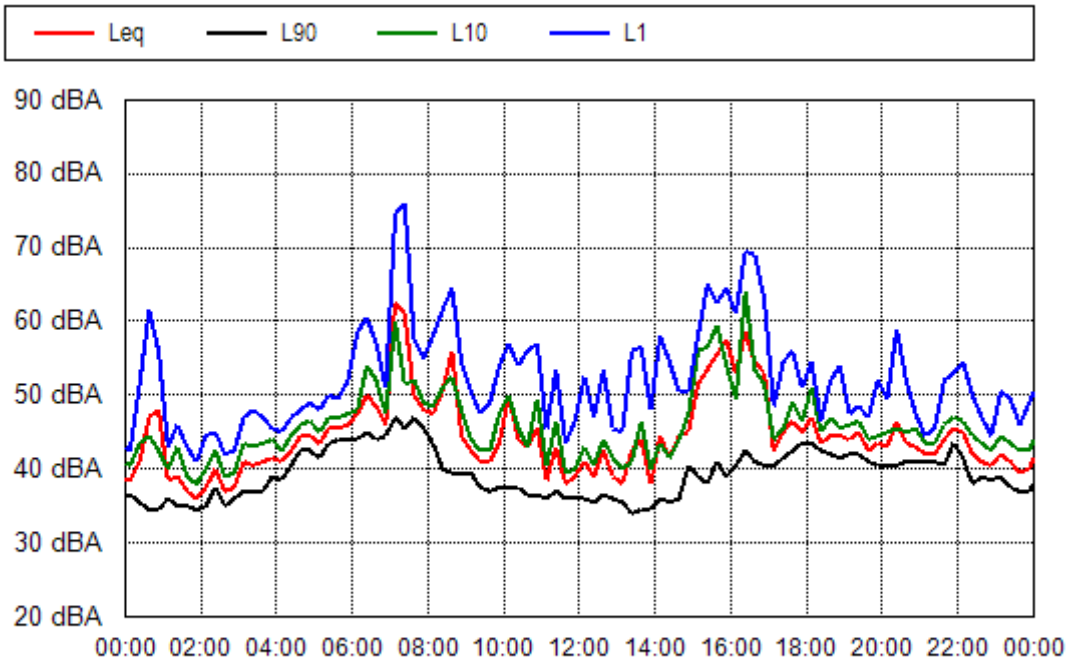

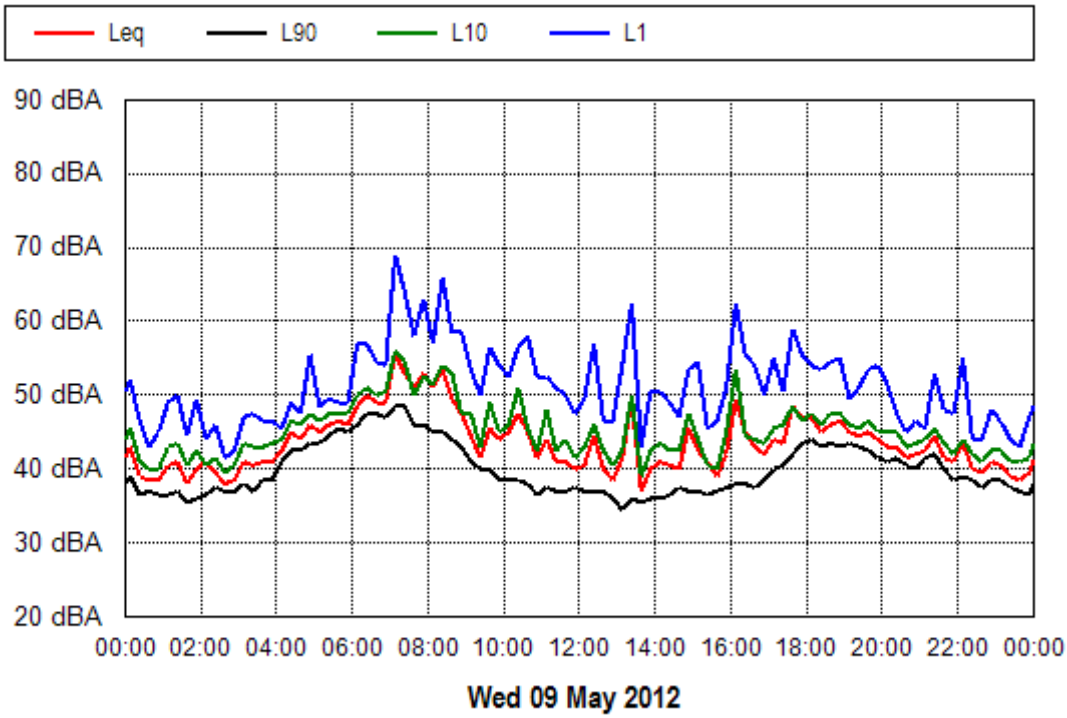

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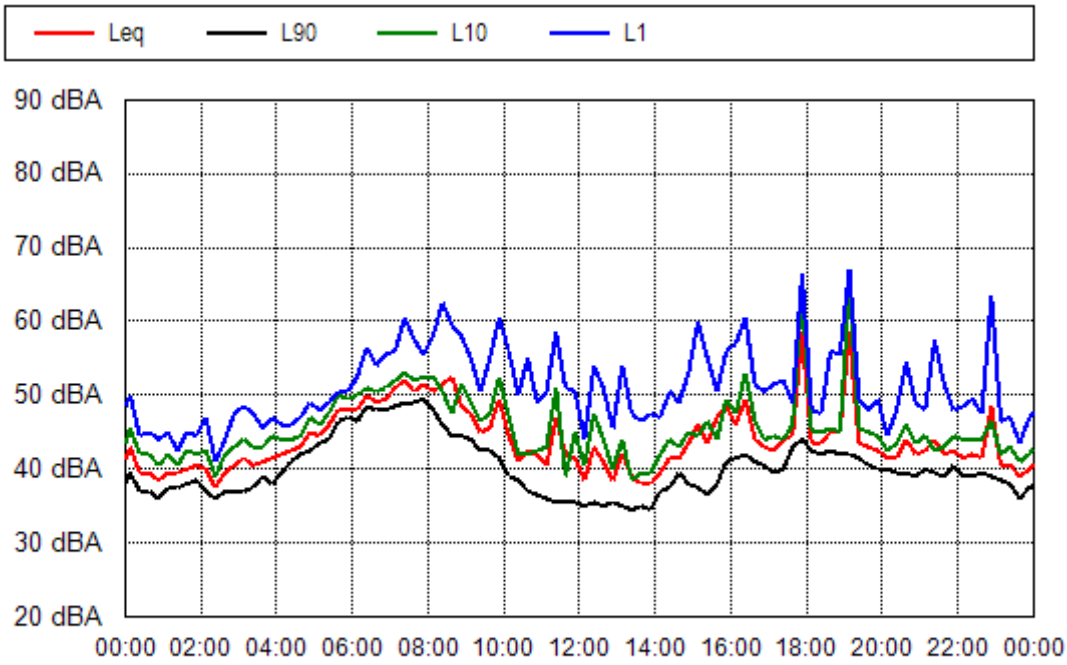

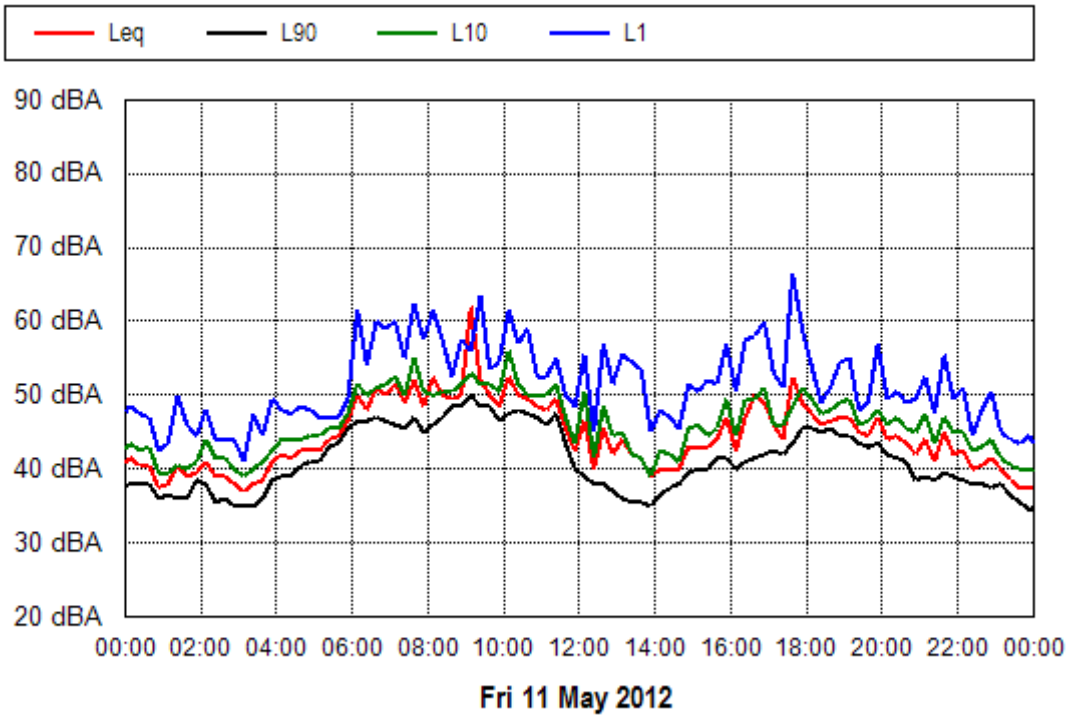

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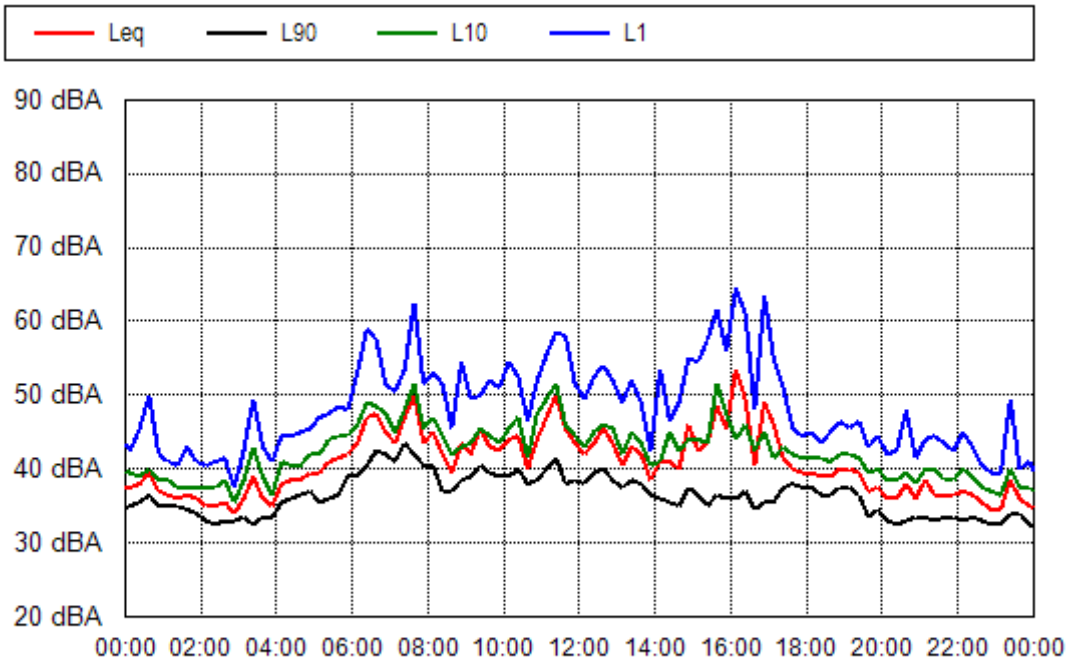

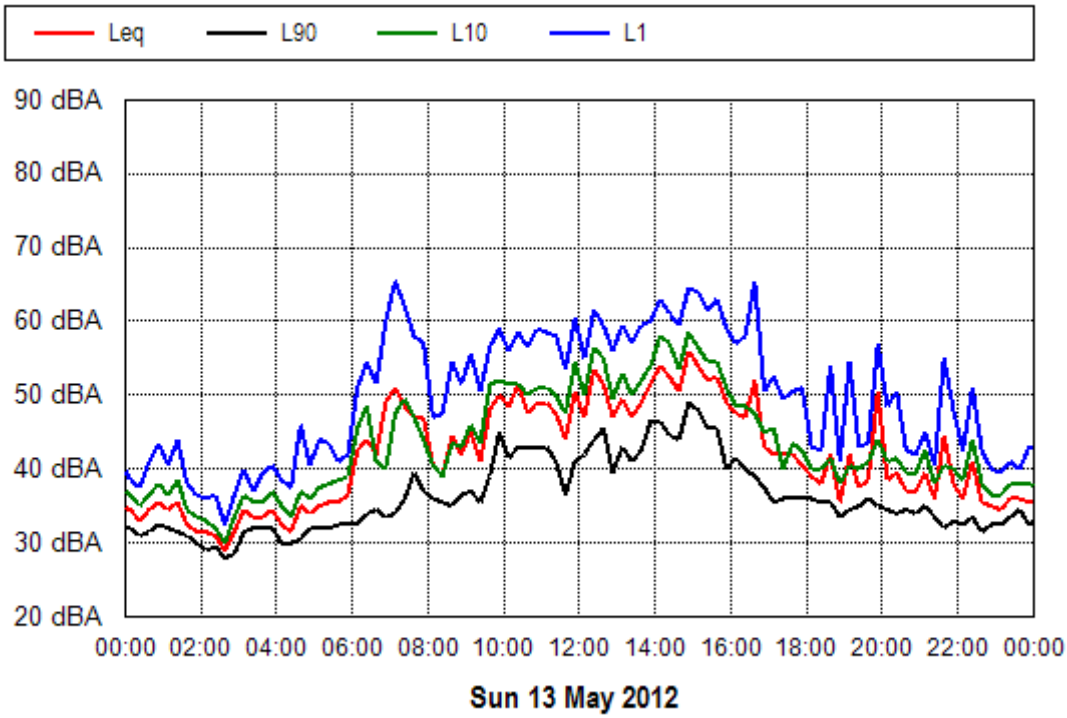

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